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OF
PENNSYLVANIA GEOLOGY—
SUPPLEMENT TO 1969

by

HOWARD ROSS CRAMER





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Annotated Bibliography of Pennsylvania Geology— Supplement to 1969

by Howard Ross Cramer

Cooperating Geologist

Pa. Geological Survey

PENNSYLVANIA GEOLOGICAL SURVEY

FOURTH SERIES

HARRISBURG

1972

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
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ANNOTATED BIBLIOGRAPHY OF PENNSYLVANIA GEOLOGY, SUPPLEMENT TO 1969

by

HOWARD ROSS CRAMER*

INTRODUCTION

This bibliography is a continuation of, and a supplement to, the Annotated bibliography of Pennsylvania geology to 1949, and the Annotated bibliography of Pennsylvania geology, supplement to 1959, published by the Pennsylvania Geological Survey as Bulletins G-34 and G-42 respectively. This bibliography contains citations, annotations, and

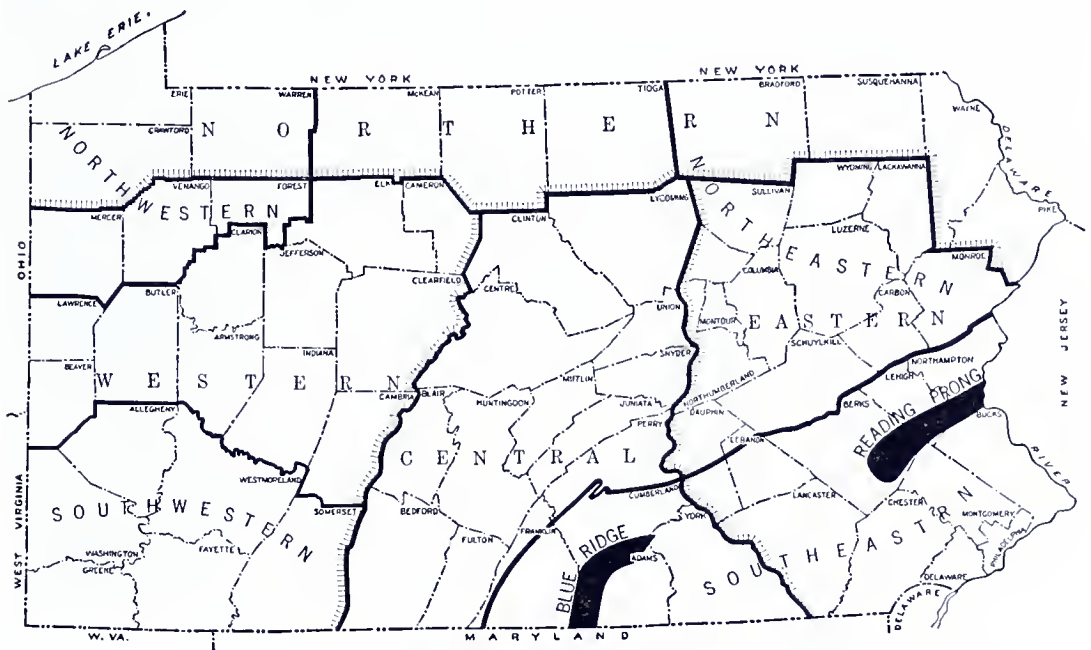


Figure 1. Index map

*Associate Professor of Geology, Emory University, Atlanta, Georgia.

indexing of not only those articles dated from 1960 to 1969, but also those of earlier dates which were overlooked in the preparation of the earlier bibliographies.

The annotation and index patterns of this supplement are similar to those established for Bulletins G-34 and G-42 which are similar to those established for the Bibliography of North American Geology and Abstracts of North American Geology published by the U. S. Geological Survey.

Each article was read, annotated, and indexed by county, subject, and geological age, where applicable. In those cases where the area involved is larger than a county, other subdivisions of the Commonwealth were employed. Those subdivisions are outlined on Fig. 1. Each county and subdivision of the Commonwealth is further subdivided into aspects of geology. These aspect subheadings are similar to those used for Bulletins G-34 and G-42, with the additions of *Geobotanical investigations*, *Meteorites*, and *Weathering*.

Theses, both MS and PhD, from colleges and universities in the United States which included data from the Commonwealth are included, but are not annotated. Abstracts are not included if the full article has appeared; they are not annotated either.

Once again the skill and patience of the reference librarians at Emory University were tried and not found wanting. The editorial assistance of Thomas W. Broadhead and Larry E. Jordon, students at Emory University, is gratefully acknowledged also.

Readers are encouraged to notify the State Geologist of any omissions to this bibliography and in Bulletins G-34 and G-42 so that they may be included in later supplements.

SERIAL PUBLICATIONS CITED

ACAD. NAT. SCI. PHILADELPHIA NOTULAE NATURAE; PROC.; SPEC. PUB. Academy of Natural Sciences of Philadelphia, Notulae Naturae, Proceedings, Special Publication. Published by the Academy from Philadelphia, Pennsylvania.

ACTA ZOOL. FENNICA. Acta Zoologica Fennica. Published by the Societas pro Fauna et Flora Fennica from Helsinki, Finland.

AGUA SUBTERRANEA. Agua Subterranea. Published by Companhia Nordestina de Sondagens e Perfuracoes from Recife, Brazil.

- AM. ANTIQUITY.** American Antiquity. Published by the Society for American Archeology from Menasha, Wisconsin.
- AM. ASSOC. ADV. SCI. PUB.** American Association for the Advancement of Science Publication. Published by the Association from New York City, New York.
- AM. ASSOC. PETROLEUM GEOLOGISTS BULL.; CROSS SECTION PUB.; MEM.** Bulletin, Cross Section Publication, Memoir of the American Association of Petroleum Geologists. Published by the Association from Tulsa, Oklahoma.
- AM. GEOPHYS. UNION MON.; TRANS.** Monographs, and Transactions of the American Geophysical Union. Published by the Union from Richmond, Virginia.
- AM. INST. MINING ENGINEERS TRANS.** Transactions of the American Institute of Mining Engineers. Published by the Institute from New York City, New York.
- AM. INST. MINING AND METALLURGICAL ENGINEERS TECH. PUB.; TRANS.** Technical Publications, and Transactions of the American Institute of Mining and Metallurgical Engineers. Published by the Institute from New York City, New York.
- AM. INST. MINING, METALLURGICAL, AND PETROLEUM ENGINEERS STAT. OF OIL AND GAS DEV. AND PROD.; TRANS.** Statistics of Oil and Gas Development and Production, and Transactions of the American Institute of Mining, Metallurgical, and Petroleum Engineers. Published by the Institute from New York City, New York.
- AM. JOUR. BOTANY.** American Journal of Botany. Published by the Botanical Society of America from Brooklyn, New York.
- AM. JOUR. MED. SCIS.** American Journal of the Medical Sciences. Published by Lea and Fedeger from Philadelphia, Pennsylvania.
- AM. JOUR. PHARMACY.** American Journal of Pharmacy. Published by the Philadelphia College of Pharmacy and Science from Philadelphia, Pennsylvania.
- AM. JOUR. SCI.** American Journal of Science. Published by Yale University from New Haven, Connecticut.
- AM. MIDLAND NATURALIST.** American Midland Naturalist. Published by Notre Dame University from Notre Dame, Indiana.
- AM. MINERALOGIST.** American Mineralogist. Published by the Mineralogical Society of America from Lancaster, Pennsylvania.

- AM. MUS. NAT. HIST. BULL.** Bulletin of the American Museum of Natural History. Published by the Museum from New York City, New York.
- AM. MUS. NOVITATES.** American Museum Novitates. Published by the American Museum of Natural History from New York City, New York.
- AM. PETROLEUM INST. DRILLING AND PRODUCTION PRACTICE; PROC.; PRODUCTION BULL.** Production Bulletin, Proceedings, and Drilling and Production Practice of the American Petroleum Institute. Published by the Institute from New York City, New York.
- AM. PETROLEUM INST., DIV. PRODUCTION PAPER; REPT.** Reports, and Papers of the Division of Production of the American Petroleum Institute. Published by the Institute from New York City, New York.
- AM. PHILOS. SOC. PROC.; YEARBOOK.** Yearbook, and Proceedings of the American Philosophical Society. Published by the Society from Philadelphia, Pennsylvania.
- AM. REFRACTORIES INST. TECH. BULL.** Technical Bulletin of the American Refractories Institute. Published by the Institute from Pittsburgh, Pennsylvania.
- AM. SOC. CIVIL ENGINEERS PROC.** Proceedings of the American Society of Civil Engineers. Published by the Society from New York City, New York.
- AM. WATER WORKS ASSOC. JOUR.** Journal of the American Water Works Association. Published by the Association from New York City, New York.
- ANAL. CHEMISTRY.** Analytical Chemistry. Published by the American Chemical Society from Washington, D. C.
- ANAT. ANZEIGER.** Anatomischer Anzeiger. Published by Gustav Fischer from Jena, Germany.
- ANNALS OF MEDICAL HISTORY.** Annals of Medical History. Published by Hoeber Publishing Company from New York City, New York.
- ANNALS OF WYOMING.** Annals of Wyoming. Published by the Wyoming Historical Society from Cheyenne, Wyoming.
- ASSOC. AM. GEOGRAPHERS ANNALS; MAP SUPPL.** Map Supplement, and Annals of the Association of American Geographers. Published by the Association from various places.
- AUSTRALIAN NATURALIST.** Australian Naturalist. Published by the Naturalists Society of New South Wales from Sydney, Australia.

- BIOL. SOC. WASHINGTON PROC.** Proceedings of the Biological Society of Washington [D. C.]. Published by the Society from Washington, D. C.
- BOSTON SOC. NAT. HIST. MEM.** Memoirs of the Boston Society of Natural History. Published by the Society from Boston, Massachusetts.
- BOT. GAZ.** Botanical Gazette. Published by the University of Chicago from Chicago, Illinois.
- BREVIORA.** Breviora. Published by Harvard University from Cambridge, Massachusetts.
- BULL. CANADIAN PETROLEUM GEOLOGY.** Bulletin of Canadian Petroleum Geology. Published commercially from Calgary, Alberta, Canada.
- BULLS. AM. PALEONTOLOGY.** Bulletins of American Paleontology. Published by the Paleontological Research Institute from Ithaca, New York.
- CANADA MINES BRANCH, DEPT. MINES AND TECH. SURVEYS RESEARCH REPT.** Research Report of the Department of Mines and Technical Surveys of the Canada Mines Branch. Published by the Branch from Ottawa, Canada.
- CANADIAN AUDOBON.** Canadian Audobon. Published by the Canadian Audobon Society from Toronto, Canada.
- CANADIAN GEOGRAPHER.** Canadian Geographer. Published by the University of Toronto, Toronto, Canada.
- CANADIAN JOUR. EARTH SCI.** Canadian Journal of the Earth Sciences. Published by the National Research Council of Canada from Ottawa, Canada.
- CARNEGIE INST. WASHINGTON YEARBOOK.** Yearbook of the Carnegie Institute in Washington. Published by the Institute from Washington, D. C.
- CARNEGIE MUS. ANNALS.** Annals of the Carnegie Museum. Published by the Museum from Pittsburgh, Pennsylvania.
- COLORADO SCHOOL MINES QUART.** Quarterly of the Colorado School of Mines. Published by the School from Golden, Colorado.
- COLORADO UNIV. STUDIES, SER. EARTH SCI.** University of Colorado Studies, Series in Earth Sciences. Published by the University from Boulder, Colorado.
- COMPASS.** The Compass of Sigma Gamma Epsilon. Published by the Fraternity from Menasha, Wisconsin, and elsewhere.

- DISSERT. ABS.** Dissertation Abstracts. Published by University Microfilms, Ann Arbor, Michigan.
- DISSERT. ABS. B.** Dissertation Abstracts, series B, Science and Technology. Published by University Microfilms, Ann Arbor, Michigan.
- DISSERT. ABS. INTERNATL. B.** Dissertation Abstracts International, series B, Science and Technology. Published by University Microfilms from Ann Arbor, Michigan.
- EARTH AND MINERAL SCI.** Earth and Mineral Science. Published by Pennsylvania State University, University Park, Pennsylvania.
- EARTH-SCI. REV.** Earth-Science Reviews. Published by Elsevier Publishing Company, Amsterdam, Holland.
- EARTH SCIENCE.** Earth Science. Published by the Midwest Federation of Mineral Societies from Downer's Grove, Illinois.
- EARTH SCIENCE.** Earth Science. Published by the Nippon Chishitsu Gakkai from Tokyo, Japan.
- ECOLOGY.** Ecology. Published by the Ecological Society of America from Brooklyn, New York.
- ECON. GEOLOGY.** Economic Geology. Published by the Society of Economic Geologists from Lancaster, Pennsylvania.
- ENGINEERING GEOLOGY.** Engineering Geology. Published by the Association of Engineering Geologists from Berkeley, California.
- EOS.** EOS. Published by the American Geophysical Union from Washington, D. C.
- EVOLUTION.** Evolution. Published by the Society for the Study of Evolution from Lawrence, Kansas.
- EXPLORER.** The Explorer. Published by the Cleveland Museum of Natural History from Cleveland, Ohio.
- FIELD CONF. PENNSYLVANIA GEOLOGISTS.** Field Conference of Pennsylvania Geologists. Published by various organizations from various places.
- FIELDIANA—GEOLOGY.** Fieldiana—Geology. Published by the Field Museum of Natural History from Chicago, Illinois.
- FRONTIERS.** Frontiers. Published by the Academy of Natural Sciences of Philadelphia from Philadelphia, Pennsylvania.

- FUEL.** Fuel. Published by the Coal Research Club from London, England.
- GEOCHIM. ET COSMOCHIM. ACTA.** Geochimica et Cosmochimica Acta. Published by the Geochemical Society from London, England.
- GEOL. ASSOC. CANADA PROC.** Proceedings of the Geological Association of Canada. Published by the Association from Toronto, Canada.
- GEOL. CENTER RESEARCH SER.** Geological Center Research Series. Published by the Center from North Wales, Pennsylvania.
- GEOL. FOEREN. STOCKHOLM FORH.** Geologiska Foereningen i Stockholm Forhandlingar. Published by the Society from Stockholm, Sweden.
- GEOL. RUNDSCHAU.** Geologische Rundschau. Published by the Geologische Vereinigung from Leipzig, Germany.
- GEOL. SOC. AMERICA ABSTRACTS WITH PROGRAMS; BULL.; ENGINEERING GEOLOGY CASE HISTORIES; MEM.; PROC.; SPEC. PAPER.** Special Papers, Proceedings, Memoirs, Engineering Geology Case Histories, Bulletin, and Abstracts with Programs of the Geological Society of America. Published by the Society from New York City, New York, and Boulder, Colorado.
- GEOL. SOC. LONDON PROC.; QUART. JOUR.** Quarterly Journal, and Proceedings of the Geological Society of London. Published by the Society from London, England.
- GEOPHYSICAL JOUR.** Geophysical Journal. Published by the Royal Astronomical Society from Oxford, England.
- GEOPHYSICS.** Geophysics. Published by the Society of Exploration Geophysicists from Houston, Texas.
- GEOTECTONICS.** Geotectonics. English translation of Geotektonika by the American Geophysical Union.
- GEOTIMES.** GeoTimes. Published by the American Geological Institute from Washington, D. C.
- GROUND WATER.** Ground Water. Published by the National Water Well Association from Urbana, Illinois.
- GUACHÁRO.** Guacháro. Published by the Haverford Grotto of the National Speleological Society from Haverford, Pennsylvania.
- HARVARD COLL. MUS. COMP. ZOOL. BULL.** Bulletin of the Harvard College Museum of Comparative Zoology. Published by Harvard University from Cambridge, Massachusetts.

- [PENNSYLVANIA DEPT.] INTERNAL AFFAIRS.** Internal Affairs. Published by the Pennsylvania Department of Internal Affairs from Harrisburg, Pennsylvania.
- INTERNATL. GEOL. CONG. PROC.** Proceedings of the numbered International Geological Congress. Published by the congress from various places.
- INTERNATL. OIL AND GAS DEVELOPMENT YEARBOOK.** International Oil and Gas Development Yearbook. Published by the American Institute of Mining Engineers from New York City, New York.
- INTERNATL. OIL SCOUTS AND LANDSMEN'S ASSOC. YEARBOOK.** Yearbook of the International Oil Scouts and Landsmen's Association. Published by the Association from Houston, Texas.
- INTERSTATE OIL COMPACT COMMISSION BULL.** Bulletin of the Interstate Oil Compact Commission. Published by the Commission from Oklahoma City, Oklahoma
- JOHNS HOPKINS UNIV. STUDIES GEOLOGY.** Johns Hopkins University Studies in Geology. Published by the University from Baltimore, Maryland.
- JOUR. GEOL. EDUCATION.** Journal of Geological Education Published by the National Association of Geology Teachers from Lawrence, Kansas.
- JOUR. GEOLOGY.** Journal of Geology. Published by the University of Chicago from Chicago, Illinois.
- JOUR GEOPHYS. RESEARCH.** Journal of Geophysical Research. Published by the American Geophysical Union from Richmond, Virginia.
- JOUR. HYDROLOGY.** Journal of Hydrology. Published by the North Holland Publishing Company from Amsterdam, Holland.
- JOUR. MAMMALOLOGY.** Journal of Mammalogy. Published by the American Society of Mammalogists from Baltimore, Maryland.
- JOUR. PALEONTOLOGY.** Journal of Paleontology. Published by the Paleontological Society, the Society of Economic Mineralogists and Paleontologists, and the Geological Society of America from Menasha, Wisconsin.
- JOUR. SED. PETROLOGY.** Journal of Sedimentary Petrology. Published by the Society of Economic Mineralogists and Paleontologists from Menasha, Wisconsin.
- KANSAS GEOL. SURVEY BULL.; COMPUTER CONTRIB.** Computer Contributions from, and Bulletin of the Kansas Geological Survey. Published by the Survey from Lawrence, Kansas.

- KENTUCKY GEOL. SURVEY SPEC. PUB.** Special Publications of the Kentucky Geological Survey. Published by the Survey from Lexington, Kentucky.
- KIRTLANDIA.** Kirtlandia. Published by the Cleveland Museum of Natural History from Cleveland, Ohio.
- LAPIDARY JOUR.** Lapidary Journal. Published commercially from San Diego, California.
- MAR BULL.** Mid-Appalachian Region Bulletin. Published by the Pittsburgh Grotto of the National Speleological Society from various places.
- MARYLAND GEOL. SURVEY [REPT.]; REPT. INVS.** Report of Investigations, and Reports of the Maryland Geological Survey. Published by the Survey from Baltimore, Maryland.
- METEORITICS.** Meteoritics. Published by the Meteoritical Society from Albuquerque, New Mexico.
- MICHIGAN UNIV. MUS. PALEONTOLOGY CONTRIB.** Contributions from the Museum of Paleontology of the University of Michigan. Published by the University from Ann Arbor, Michigan.
- MICROPALEONTOLOGY.** Micropaleontology. Published by the American Museum of Natural History from New York City, New York.
- MINERAL INDUSTRIES.** Mineral Industries. Published by the Pennsylvania State University from University Park, Pennsylvania.
- MINING CONG. JOUR.** Mining Congress Journal. Published by the American Mining Congress from Denver, Colorado.
- MINING ENGINEERING.** Mining Engineering. Published by the American Institute of Mining, Metallurgical, and Petroleum Engineers from New York City, New York.
- NATL. ACAD. SCI. BIOG. MEM.** Biographical Memoirs of the National Academy of Sciences. Published by the Academy from Washington, D. C.
- NATL. OIL SCOUTS AND LANDSMEN'S ASSOC. YEARBOOK.** Yearbook of the National Oil Scouts and Landsmen's Association. Published by the Association from Houston, Texas.
- NATL. PETROLEUM NEWS.** National Petroleum News. Published by McGraw-Hill Company from New York City, New York.
- NATL. SPELEOL. SOC. BULL.; NSS NEWS.** NSS News, and Bulletin of the National Speleological Society. Published by the Society from Washington, D. C.

- NATURALISTE CANADIEN.** *Naturaliste Canadien.* Published by the Cité University from Quebec, Canada.
- NATURE.** *Nature.* Published by the MacMillan Company from London, England.
- NETHERWORLD NEWS.** *Netherworld News.* Published by the Pittsburgh Grotto of the National Speleological Society from Pittsburgh, Pennsylvania.
- NEW JERSEY GEOL. SURVEY GEOL. REPT. SER.** *Geological Report Series of the New Jersey Geological Survey.* Published by the Survey from Trenton, New Jersey.
- NEW YORK ACAD. SCI. ANNALS; TRANS.** *Transactions, and Annals of the New York Academy of Science.* Published by the Academy from Albany, New York.
- NEW YORK STATE MUS. BULL.** *Bulletin of the New York State Museum.* Published by the Museum from Albany, New York.
- NEW YORK STATE MUS. AND SCI. SERVICE BULL.; MAP AND CHART SER.** *Map and Chart Series, and Bulletin of the New York State Museum and Science Service.* Published by the Museum from Albany, New York.
- NITTANY GROTTO NEWS.** *Nittany Grotto News.* Published by the Nittany Grotto of the National Speleological Society from State College, Pennsylvania.
- OHIO DIV. GEOL. SURVEY BULL.; REPT. INV.** *Report of Investigation, and Bulletin of the Ohio Division of Geological Survey.* Published by the Survey from Columbus, Ohio.
- OHIO JOUR. SCI.** *Ohio Journal of Science.* Published by the Ohio Academy of Science from Columbus, Ohio.
- OIL AND GAS JOUR.** *Oil and Gas Journal.* Published commercially from Dallas, Texas, and elsewhere.
- OIL FIELD ENGINEERING.** *Oil Field Engineering.* Published commercially from Cincinnati, Ohio.
- OIL WEEKLY.** *Oil Weekly.* Published commercially from Houston, Texas.
- OKLAHOMA GEOL. NOTES.** *Oklahoma Geology Notes.* Published by the Oklahoma Geological Survey from Norman, Oklahoma.
- PALAEO GEOGRAPHY, PALAEO ECOLOGY, PALAEO CLIMATOLOGY.** *Palaeogeography, Palaeoecology, Palaeoclimatology.* Published by the Elsevier Publishing Company from Amsterdam, Holland.

PALAEONTOGRAPHICA, SER. B. Palaeontographica, Abteilung B, Palaeophytologie. Published by E. Schweizerbart'sche from Stuttgart, Germany.

PALAEONTOGRAPHICA AMERICANA. Palaeontographica Americana. Published by the Paleontological Research Institute from Ithaca, New York.

PALAEONTOL. ZEITSCHR. Palaeontologische Zeitschrift. Published by the Palaeontologische Gesellschaft from Berlin, Germany.

PALAEONTOLOGY. Palaeontology. Published by the Palaeontological Association from London, England.

PENNSYLVANIA ACAD. SCI. PROC. Proceedings of the Pennsylvania Academy of Science. Published by the Academy from Harrisburg, Pennsylvania.

PENNSYLVANIA AGRIC. EXPER. STA. BULL. Bulletin of the Pennsylvania Agricultural Experiment Station. Published from University Park, Pennsylvania.

PENNSYLVANIA ARCHAEOLOGIST. Pennsylvania Archaeologist. Published by the Society of Pennsylvania Archeologists from Aliquippa, Pennsylvania.

PENNSYLVANIA DEPT. HEALTH, DIV. SANITARY ENGINEERING PUB. Publications of the Division of Sanitary Engineering of the Pennsylvania Department of Health. Published by the Department from Harrisburg, Pennsylvania.

PENNSYLVANIA GEOL. SURVEY, 4TH SER. ATLAS; BULL.; EDUC. SER.; INF. CIRC.; MAP; MINERAL RESOURCE REPT.; PROG. REPT.; SPEC. BULL.; STATE PARK GUIDE. State Park Guides, Special Bulletins, Progress Reports, Mineral Resources Report, Map, Information Circular, Educational Series, Bulletins, and Atlas of the Pennsylvania Geological Survey. Published by the Pennsylvania Bur. Topographic and Geologic Survey from Harrisburg, Pennsylvania.

PENNSYLVANIA HISTORY. Pennsylvania History. Published by the Pennsylvania Historical Association from University Park, Pennsylvania.

PENNSYLVANIA MAG. HISTORY AND BIOGRAPHY. Pennsylvania Magazine of History and Biography. Published by the Historical Society of Pennsylvania from Philadelphia, Pennsylvania.

PENNSYLVANIA STATE UNIV. EARTH AND MINERAL SCI. EXPER. STA. BULL. Bulletin of the Earth and Mineral Sciences Experiment Station of the Pennsylvania State University. Published by the University from University Park, Pennsylvania.

PENNSYLVANIA STATE UNIV. ENGINEERING RESEARCH BULL. Bulletin of Engineering Research from the Pennsylvania State University. Published by the University from University Park, Pennsylvania.

- PENNSYLVANIA STATE UNIV. MINERAL INDUSTRIES EXPER. STA. BULL.; CIRC.; SPEC. PUB.** Special Publications, Circular, and Bulletin of the Mineral Industries Experiment Station of the Pennsylvania State University. Published by the University from University Park, Pennsylvania.
- PENNSYLVANIA WATER WORKS OPERATORS ASSOC. JOUR.** Journal of the Pennsylvania Water Works Operators Association. Published by the Association from Harrisburg, Pennsylvania.
- PHILADELPHIA GROTTO DIGEST.** Philadelphia Grotto Digest. Published by the Philadelphia Grotto of the National Speleological Society from Philadelphia, Pennsylvania.
- PHILADELPHIA MEDICAL MUSEUM.** Philadelphia Medical Museum. Published commercially from Philadelphia, Pennsylvania.
- PHOTOGRAMM. ENGINEERING.** Photogrammetric Engineering. Published by the American Society of Photogrammetry from Falls Church, Virginia.
- PLATEAU.** Plateau. Published by the Northern Arizona Society of Science and Art from Flagstaff, Arizona.
- POSTILLA.** Postilla. Published by Peabody Museum of Yale University from New Haven, Connecticut.
- PRODUCERS MONTHLY.** Producers Monthly. Published commercially from Bradford, Pennsylvania.
- PSYCHE.** Psyche. Published by the Cambridge Entomological Club from Boston, Massachusetts.
- PURDUE UNIV. ENGINEERING BULL.** Purdue University Engineering Bulletin. Published by the University from LaFayette, Indiana.
- RADIOCARBON.** Radiocarbon. Published by Yale University from New Haven, Connecticut.
- REV. MODERN PHYSICS.** Reviews of Modern Physics. Published by the American Physical Society from New York City, New York.
- REV. PALAEOBOTANY AND PALYNOLOGY.** Review of Palaeobotany and Palynology. Published by the Elsevier Publishing Company, Amsterdam, Holland.
- ROCKS AND MINERALS.** Rocks and Minerals. Published commercially from Peekskill, New York.
- ROY. SOC. CANADA MINUTES PROC.** Minutes and Proceedings of the Royal Society from Ottawa, Canada. Published by the Society from Ottawa, Canada.

- SCIENCE.** Science. Published by the American Association for the Advancement of Science from Washington, D. C.
- SEDIMENTOLOGY.** Sedimentology. Published by the Elsevier Publishing Company from Amsterdam, Holland.
- SHALE SHAKER.** Shale Shaker. Published by the Oklahoma City Geological Society, Oklahoma City, Oklahoma.
- SHALE SHAKER DIGEST.** Shale Shaker Digest. Published by the Oklahoma City Geological Society from Oklahoma City, Oklahoma.
- SHIPPENSBURG GROTTO NEWSLETTER.** Shippensburg Grotto Newsletter. Published by the Shippensburg Grotto of the National Speleological Society from Shippensburg, Pennsylvania.
- SMITHSONIAN MISC. COLLECTIONS.** Smithsonian Miscellaneous Collections. Published by the Smithsonian Institution from Washington, D. C.
- SOC. ECON. MINERALOGISTS AND PALEONTOLOGISTS SPEC. PUB.** Special Publication of the Society of Economic Mineralogists and Paleontologists. Published by the Society from Menasha, Wisconsin.
- SOC. MINING ENGINEERS TRANS.** Transactions of the Society of Mining Engineers. Published by the Society from New York City, New York.
- SOC. VERTEBRATE PALEONTOLOGY NEWS BULL.** News Bulletin of the Society of Vertebrate Paleontology. Published by the Society from Cambridge, Massachusetts, and elsewhere.
- SOIL SCI. SOC. AMERICA PROC.** Proceedings of the Soil Science Society of America. Published by the Society from Ann Arbor, Michigan.
- SOUTHEASTERN GEOLOGY.** Southeastern Geology. Published by Duke University from Durham, North Carolina.
- SPECIAL LIBRARIES ASSOC., GEOGRAPHY AND MAP DIV. BULL.** Bulletin of the Geography and Map Division of the Special Libraries Association. Published by the Association from New York City, New York.
- SPELEO DIGEST.** Speleo Digest. Published irregularly by various grottos of the National Speleological Society from various places.
- STANFORD UNIV. PUBS. GEOL. SCI.** Stanford University Publications in the Geological Sciences. Published by the University from Palo Alto, California.
- STATE GEOLOGISTS JOUR.** Journal of the Association of State Geologists. Published by the Association from various places.

- SYSTEMATIC ZOOLOGY.** Systematic Zoology. Published by the Society of Systematic Zoology from Lawrence, Kansas.
- TEXAS JOUR. SCI.** Texas Journal of Science. Published by the Texas Academy of Science from Austin, Texas.
- TORREY BOT. CLUB BULL.** Bulletin of the Torrey Botanical Club. Published by the Club from New York City, New York.
- TULSA GEOL. SOC. DIGEST.** Tulsa Geological Society Digest. Published by the Society from Tulsa, Oklahoma.
- UNIV. CALIFORNIA MEM.** Memoirs of the University of California. Published by the University from Berkeley, California.
- U. S. ATOMIC ENERGY COMMISSION REPT.** Report of the United States Atomic Energy Commission. Published by the Commission from Washington, D. C. and elsewhere.
- U. S. BUR. MINES BULL.; INF. CIRC.; MINERALS YEARBOOK; MON.; REPT. INV.; TECH. PAPER.** Technical Paper, Report of Investigation, Monograph, Mineral Yearbook, Information Circular, and Bulletin of the United States Bureau of Mines. Published by the Bureau from Washington, D. C.
- U. S. COAST AND GEOD. SURVEY SPEC. PUB.** Special Publication of the United States Coast and Geodetic Survey. Published by the Survey from Washington, D. C.
- U. S. GEOL. SURVEY BULL.; CIRC.; COAL INVS. MAP; GEOL. QUAD. MAPS OF THE U. S.; GEOPHYS. INVS. MAP; HYDROL. INVS. MAP; MINERAL INVS. RESOURCE MAP; MISC. GEOL. INVS. MAP; PROF. PAPER; REPTS. OPEN FILE; TRACE ELEMS. INVS.; WATER-SUPPLY PAPER.** Water Supply Paper, Trace Elements Investigations, Reports Open File, Professional Paper, Miscellaneous Geological Investigations Map, Mineral Resource Investigations Map, Hydrological Investigations Map, Geophysical Investigations Map, Geological Quadrangle Maps of the U. S., Coal Investigations Map, Circular, and Bulletin of the United States Geological Survey. Published by the Survey from Washington, D. C.
- U. S. NATL. MUS. PROC.** Proceedings of the United States National Museum. Published by the Museum from Washington, D. C.
- VIRGINIA POLYTECH. INST., GEOL. DEPT. MEM.** Memoir of the Geology Department of Virginia Polytechnical Institute. Published by the Institute from Blacksburg, Virginia.

WATER RESOURCES BULL. Water Resources Bulletin. Published by the American Water Resources Association from Urbana, Illinois.

WATER RESOURCES RESEARCH. Water Resources Research. Published by the American Geophysical Union from Washington, D. C.

WEST VIRGINIA ACAD. SCI. PROC. Proceedings of the West Virginia Academy of Science. Published by the Academy from Morgantown, West Virginia.

WEST VIRGINIA GEOL. SURVEY BULL. Bulletin of the West Virginia Geological Survey. Published by the Survey from Morgantown, West Virginia.

WORLD OIL. World Oil. Published commercially from Houston, Texas.

WORLD'S BELOW. World's Below. Published by the Chambersburg Grotto of the National Speleological Society from Chambersburg, Pennsylvania.

YALE UNIV. PEABODY MUS. NAT. HIST. BULL. Bulletin of the Peabody Museum of Natural History of Yale University. Published by the University from New Haven, Connecticut.

YORK GROTTO NEWSLETTER. York Grotto Newsletter. Published by the York Grotto of the National Speleological Society from York, Pennsylvania.

ZEITSCHR. GEOMORPHOLOGIE. Zeitschrift für Geomorphologie. Published commercially from Leipzig, Germany.

BIBLIOGRAPHY

AARON, JOHN M., *see also* Drake, Avery Ala, Jr., 9.

1. Petrology and origin of the Hardyston Quartzite (Lower Cambrian) in [south] eastern Pennsylvania and western New Jersey, *in* Geology of selected areas in New Jersey and eastern Pennsylvania: New Brunswick, New Jersey, Rutgers Univ. Press, p. 21-34, illus., **1969**. The formation, about 100 feet thick, is described in great detail. It was derived from high-grade metamorphic and igneous rocks, probably from the Reading Prong. It is both alluvial and marine in origin.

ABERNETHY, ROY FRANKLIN.

1. (and Gibson, Francis Harold). Rare elements in coal: U. S. Bur. Mines Inf. Circ. 8163, 69 p., illus., **1963**. Thirty-one elements are considered. The results of numerous analyses, many taken from previously-published accounts, are given. Many of the samples are of Pennsylvania coals.
2. (and Gibson, Francis Harold and Frederic, W. H.). Phosphorus, chlorine, sodium, and potassium in U. S. coals: U. S. Bur. Mines Rept. Inv. 6579, 34 p., illus., **1965**. Included are analyses of many different coals from many places in the state. The percent of each element in the dry coal and in the ash is tabulated.

ACKERMANN, HANS DIETRICH.

1. Gravity investigations in northeastern and central Pennsylvania: MS Thesis, Pennsylvania State Univ., **1962**; (and Howell, Benjamin Franklin, Jr.). Gravity investigations in northeastern and central Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 36, p. 218-224, illus., **1962**. A minimum Bouguer anomaly nearly coincides with the deepest portion of the Appalachian structural basin. Most, but not all, of the large structural features in the Valley and Ridge Province show no significant local gravity anomalies.

ADAMS, JOHN WAGSTAFF, *see* Olson, Jerry Chipman, 1.

ADAMS, ROBERT WALTER.

1. The [Mississippian] Greenbrier Limestone of [southwestern] Pennsylvania, Maryland, and West Virginia: PhD Thesis, Johns Hopkins Univ., **1964**.
2. [Mississippian] Loyahanna Limestone, cross-bedding and provenance: PhD Thesis, Johns Hopkins Univ., **1966**.

ADLER, ALAN A.

1. Flood plain sedimentation of Halfmoon Creek [Centre County]: MS Thesis, Pennsylvania State Univ., **1960**; (and Lattman, Laurence Harold). Pennsylvania State Univ. Mineral Industries Exper. Sta. Bull. 77, p. 1-11, illus., **1961**. Although there is a continuous gradation from gravel to the finest sediment, lateral accretion can be distinguished from overbank deposition. The former comprises about two-thirds of the volume of the sediments.

AGNEW, ALLEN FRANCIS.

1. State and federal geological surveys—their history and growth: *State Geologists Jour.*, v. 20, no. 2, p. 32-35, **1968**. A cursory summary of the historical development of state surveys includes that of Pennsylvania, which started very early.

AL-MISHWT, ALI, *see* Villaume, J. F., 1; Warner, Jeffrey, 1.

ALDRICH, LYMAN THOMAS.

1. (and others). Radioactive ages of rocks: *Carnegie Inst. Washington Yearbook* 60, 1960-61, p. 250-256, illus., **1961**. Gneiss from Philadelphia County has a K-Ar age for hornblende of 430 my, of 550 my for biotite, a Rb-Sr age of 390 my for biotite, and a Pb^{207}/Pb^{206} age of 1120 my for zircon. Furthermore, gneiss from Devault, Chester County, has a K-Ar age for hornblende of 960 my and 1010 my for biotite whereas the Rb-Sr age for the biotite is 485 my.

ALDRICH, MERRITT JAMES, JR.

1. Graptolites in a [Ordovician] bentonite bed near Carlisle [Cumberland County], Pennsylvania [abs.]: *Pennsylvania Acad. Sci. Proc.*, v. 39, no. 1, p. 22, **1965**.
2. Cambrian dolomite in the Martinsburg Formation [south] eastern Pennsylvania: *Pennsylvania Acad. Sci. Proc.*, v. 41, p. 133-140, illus., **1967**. Dolomite, previously thought to be interbedded stratigraphically in the Martinsburg Formation is shown, by detailed structural analysis, to be a large block of Cambrian Allentown Dolomite which slid as a unit into the basin which was receiving Martinsburg shale sedimentation.

ALLING, HAROLD LATTIMORE.

1. (and Briggs, Louis Irving). Stratigraphy of Upper Silurian Cayugan evaporites: *Am. Assoc. Petroleum Geologists Bull.*, v. 45, no. 4, p. 515-547, illus., **1961**. The Silurian in western Pennsylvania is included; it is up to 2,000 feet thick and contains much salt in the subsurface. Regional facies studies are made, and the Appalachian basin is shown to be distinct from the Ohio and Michigan basins. Fossil lists are included.

ALLEN, JOHN ROBERT LAURENCE.

1. (and Friend, Peter Furneaux). Deposition of the Catskill facies, Appalachian region—with some notes on other Old Red Sandstone basins, in *Late Paleozoic and Mesozoic continental sedimentation, northeastern North America: Geol. Soc. America Spec. Paper* 106, p. 21-74, illus., **1968**. Three facies are recognized, two terrestrial and one tidal marine; they grade horizontally into each other. Petrologic and stratigraphic details are included.

ALTERMAN, INA B.

1. An Ordovician boulder conglomerate at the base of the Hamburg Klippe [Berks County] [abs.]: Geol. Soc. America Abstracts with Programs, 1969, pt. 1, p. 1-2, **1969**.

ALVORD, DONALD CLAYTON, *see* Drake, Avery Ala, Jr., I.

AMBROSE, JOHN WILLIS.

1. Cyril Workman Knight, 1879-1960: Roy. Soc. Canada Minutes Proc., 3d ser. v. 56, p. 201-206, port., **1962**.

AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, *see also* United States Geological Survey, 1.

1. (and United States Geological Survey). Basement map of North America between latitudes 24° and 60° N: Washington, D. C., U. S. Geol. Survey, scale, 1:5,000,000, **1967**. The basement surface slopes southeastward from 6,000 feet in Erie County to over 40,000 feet just east of Harrisburg. It is at the ground surface in southeastern Pennsylvania.

AMERICAN GEOPHYSICAL UNION.

1. (and United States Geological Survey). Bouguer gravity anomaly map of the United States (exclusive of Alaska and Hawaii): Washington, D. C., U. S. Geol. Survey, scale, 1:2,500,000, 2 sheets, **1964**.

AMERICAN INSTITUTE OF MINING, METALLURGICAL, AND PETROLEUM ENGINEERS.

1. (and Gillson, Joseph Lincoln, and others, editors). Industrial minerals and rocks—nonmetallics other than fuels, 3rd ed.: New York, Am. Inst. Mining, Metallurgical, and Petroleum Engineers, 934 p., illus., **1960**. Various products are included from Pennsylvania, although little specific information about any is included.

AMES, H. TATE, *see* Stingelin, Ronald Werner, 2.

AMSTUTZ, GERHARDT CHRISTIAN, *see* Haentzschell, Walter, 1.

ANDERS, EDWARD.

1. Meteorite ages: Rev. Modern Physics, v. 34, no. 2. p. 287-325, illus., **1962**. The Mt. Joy meteorite has a terrestrial age of less than 350 years, based on the Ar³⁹ and C¹⁴ contents.

ANDERSON, EDWIN JOSEPH, *see* Head, James W., 3d, 4.

ANDERSON, LENNART A.

1. (and Keller, George Vernon), Experimental deep resistivity probes in the central and eastern United States: Geophysics, v. 31, no. 6, p. 1105-1122, illus., **1966**. A source dipole in Centre County was used, along with data available from numerous sources about the physical and electrical properties of the rocks in the area. Because of the thickness

of the sedimentary column and the lateral changes in its thickness with the spacings obtained in this survey, it is not possible to say that the basement is other than insulating even though the maximum observed resistivities along the asymptotic portion of the sounding curves are only 300 ohm- m.

ANDERSON, PETER W., *see also* Durfor, Charles Norman, 1.

1. Variations in the chemical character of the Susquehanna River at Harrisburg, [Dauphin County], Pennsylvania: U. S. Geol. Survey Water-Supply Paper 1779B, p. B1-B17, illus., **1963**. The influence of the geology of the drainage basin is discussed. Each geologic environment influences the chemical character of the stream. Limestone and glacial drift are especially influential.

ANDERSON, RICHARD R.

1. Pennsylvania cave maps in N.S.S. cave files: Nittany Grotto News, v. 10, no. 1, p. 10-14, **1961**. Numerous maps of caves are listed by county, scale, date of survey, and quality of survey.

ANDERSON, T. H.

1. (and Drake, David E., and Wise, Donald Underkoffler). Megapetrofabric of the Coatesville-Doe Run area, [Chester County] Penna.: Pennsylvania Acad. Sci. Proc., v. 38, no. 2, p. 174-182, illus., **1965**. An older system of northeast striking isoclinal folds is disrupted by basement uplift of the Blue Ridge-Chester Valley Zone and by north-south striking folds, related to the Woodville Dome. Strike-slip faulting is possible, and shows multiple deformation.

ANDREASEN, GORDON ELLSWORTH, *see* Henderson, John Richard, Sr., 2.

ARKLE, THOMAS, JR.

1. Regional aspects of the Monongahela Series of the Appalachian Basin [western Pennsylvania] [abs.]: Geol. Soc. America Bull., v. 71, no. 12, pt. 2, p. 1817, 1960; West Virginia Acad. Sci. Proc. 1959-1960, v. 31-32, p. 58, **1960**.

ARMSTRONG, RICHARD LEE, *see also* Pierce, Kenneth Lee, 3.

1. (and Besaneon, James). Upper Triassic time scale [southeastern Pennsylvania] [abs.]: EOS, v. 50, no. 4, p. 329, **1969**.

ARNDT, HAROLD HARRY, *see also* Danilehik, Walter, 1; Trexler, John Peter, 2, 3, 4; Wood, Gordon Harry, Jr., 3, 13, 15.

1. (and Wood, Gordon Harry, Jr.). Late Paleozoic orogeny in [north] eastern Pennsylvania consists of five progressive stages, in Geological Survey research 1960: U. S. Geol. Survey Prof. Paper 400B, p. B182-B184 illus., **1960**. The Appalachian orogeny proceeded through a se-

- quence of five structural stages. The anthracite region (the most complex) passed through the first four of the stages, whereas toward the northwest, only the first stage (the least complex) is evident.
2. (and Wood, Gordon Harry, Jr., and Trexler, John Peter). Subdivision of the Catskill Formation in the western part of the Anthracite Region of [northeastern] Pennsylvania, in Geological Survey research 1962: U. S. Geol. Survey Prof. Paper 450C, p. C32-C36, illus., **1962**. Six members are recognized which are, from oldest to youngest: Irish Valley, Damascus, Honesdale, Cherry Ridge, Buddy's Run, and Spechty Kopf. Each is distinct, and each is discussed.
 3. Carboniferous rocks, in Geology of the southern part of the [northeastern] Pennsylvania Anthracite Region—Field Trip no. 4, 1963, Guidebook: New York, Geol. Soc. America, p. 3-12, illus., **1963**. A description of Mississippian and Pennsylvanian rocks in northeastern Pennsylvania is given in preparation for a 2 day field trip. They unconformably overlie the Devonian Catskill Formation.
 4. (and Wood, Gordon Harry, Jr., and Danilchik, Walter). Geology of anthracite in the southern part of the Trevorton Quadrangle, Northumberland County, Pennsylvania: U. S. Geol. Survey Coal Invs. Map C 48, 2 sheets, scale, 1:12,000, text, **1963**. Anthracite occurs only in Pennsylvanian rocks, which are described. The structure is a large, east-west trending synclinorium which has been extensively faulted. Coal-bed correlations are made.
 5. (and Danilchik, Walter, and Wood, Gordon Harry, Jr.). Geology of anthracite in the western part of the Shamokin Quadrangle, Northumberland County, Pennsylvania: U. S. Geol. Survey Coal Invs. Map C 47, 2 sheets, scale, 1:12,000, text, **1963**. A very general description of the Mississippian and Pennsylvanian stratigraphy of the region includes coal bed correlations and descriptions. A coal outcrop map and a structure contour map of the Buck Mountain Coal is included. The structure is a complexly-faulted synclinorium.

ASH, SIMON HARRY.

1. (and Davis, B. S., and Jenkins, H. E., and Romischer, W. M.). Barrier pillars in Lackawanna Basin, northern field [Lackawanna County]—Anthracite Region of Pennsylvania: U. S. Bur. Mines Bull. 517, 114 p., illus., **1952**. Thicknesses of coal beds exposed in the pillars are included in an otherwise engineering-oriented report.
2. (and Eaton, W. L., and Whaite, Ralph H.). Surface-water seepage into anthracite mines in the Lackawanna Basin [Lackawanna County] northern field—Anthracite Region of Pennsylvania: U. S. Bur. Mines Bull. 518, 37 p., illus., **1952**. Evidence is shown that about 22 percent of water in the mines arrives underground by direct surface seepage, and about the same amount seeps underground from the small streams in the region. The balance seeps in from the Lackawanna River.
3. (and Kynor, H. D.). Barrier pillars in the southern field [northeastern Pennsylvania]—Anthracite Region of Pennsylvania: U. S. Bur. Mines Bull. 526, 44 p., illus., **1953**. In an otherwise strictly engineering report are included descriptions of some of the coal beds exposed in the mine pillars.

4. (and Kennedy, Donald O., and Link, Howard B., and Romischer, W. M.). Barrier pillars in the Western Middle field [northeastern Pennsylvania]—Anthracite Region of Pennsylvania: U. S. Bur. Mines Bull. 521, 92 p., illus., **1953**. Thicknesses of various coal beds in the underground pillars are recorded. The report is otherwise entirely of an engineering nature.
5. Barrier pillars in Wyoming Basin, northern field—Anthracite Region of [Lackawanna and Luzerne Counties] Pennsylvania: U. S. Bur. Mines Bull. 538, 251 p., illus., **1954**. In an otherwise engineering report of the occurrence and nature of pillars, are sections of the anthracite-bearing beds observed in the pillars.
6. (and Whaite, Ralph H.). Surface-water seepage into anthracite mines in the Wyoming Basin, northern field [Luzerne County] Anthracite Region of Pennsylvania: U. S. Bur. Mines Bull. 534, 30 p., illus., **1954**. The Susquehanna River, including its gravel-filled buried, abandoned channel, contributes 99% of the surface water seeping underground into the mines.
7. (and Dierks, Henry A. and Miller, Philip Samuel). Mine flood prevention and control—Final report of the anthracite flood-prevention project engineers: U. S. Bur. Mines Bull. 562, 100 p., illus., **1957**. A cursory description of the geology of the anthracite fields is included. Much emphasis is placed on the relation of the ground water to the geological structures and associated mining problems. The engineering aspects of a tunnel system to drain the mine water to tidewater are discussed also.

ASHLEY, GEORGE HALL, 1866-1951.

1. Water bearing strata: Pennsylvania Water Works Operators Assoc. Jour., v. 4, p. 98-101, **1932**. A generalized summary of the occurrence of ground water and the conditions affecting it includes examples from Pennsylvania.

AULT, WAYNE URBAN.

1. (and Kulp, John Laurence). Isotopic geochemistry of sulfur: *Geochim. et Cosmochim. Acta*, v. 16, no. 2, p. 201-235, illus., **1959**. The sulfur isotope ratios in pyrite and chalcopyrite from the Cornwall Mine in Lebanon County are used with other ratios from elsewhere to show that magmatic fractionation of sulfur is not significant.
2. (and Kulp, John Laurence). Sulfur isotopes and ore deposits: *Econ. Geology*, v. 55, no. 1, p. 73-100, illus., **1960**. In a general discussion of sulfur isotope fractionation, examples are cited from the sulfide ores from the Friedensville Mine, Lehigh County.

AUSTIN, NANCY C.

1. Subsurface Tully Limestone [Devonian], New York and northern Pennsylvania [abs.]: *Geol. Soc. America Abstracts with Programs* 1969, pt. 1, p. 2, **1969**.

AVERITT, PAUL.

1. Coal reserves of the United States, January 1, 1960, in *Geological Survey research 1960*: U. S. Geol. Survey Prof. Paper 400B, p. B81-B82, illus.,

- 1960.** A table shows Pennsylvania to still contain over 35 billion tons of coal remaining in reserve, assuming 50% recovery.
2. Coal reserves of the United States—A progress report, January 1, 1960: U. S. Geol. Survey Bull. 1136, 116 p., illus., **1961**. Pennsylvania is estimated to have 58,527 million tons of bituminous coal remaining, of which 29,263 million tons are recoverable. There are 12,355 million tons of anthracite remaining, of which 6,178 million tons are recoverable.
 3. Stripping-coal resources of the United States: U. S. Geol. Survey Bull. 1252C, p. C1-C20, illus., **1968**. Strip-minable coal in Pennsylvania has already largely been won, and the northern Appalachian area is now only third in potential in the nation. Pennsylvania contained but 8,000 million tons of coal at less than 100 feet in depth originally, of which about 25% has been removed to date.
 4. Coal resources of the United States, January 1, 1967: U. S. Geol. Survey Bull. 1275, 116 p., illus., **1969**. In the commonwealth there are 57,533 million tons of bituminous coal and 12,117 million tons of anthracite coal remaining. Some discussion of the occurrence of minor elements is included.

EVERY, GENE.

1. (and Richter, Dennis). An airphoto index to physical and cultural features in eastern United States: Photogram. Engineering, v. 31, no. 5, p. 896-914, illus., **1965**. Eleven locations throughout Pennsylvania, along with many others from elsewhere, are selected as good examples of various types of features to be seen on aerial photographs. The number of the photos are given for convenience of ordering them.

AYRTON, WILLIAM GREY.

1. Isopach and lithofacies map of the Upper Devonian of northeastern United States, in Symposium on Middle and Upper Devonian stratigraphy of Pennsylvania and adjacent states: Pennsylvania Geol. Survey, 4th ser. Bull. G 39, p. 3-6, illus., **1963**. A small-scale map includes all but southeastern Pennsylvania. Distinct southwest-northeast trending zones of decreasing clastic ratio are evident, whereas the thickness increases to over 8,000 feet from every direction toward the southeast.

BAILEY, CHARLES.

1. (and Clark, David). Center Cave, Philadelphia County: Guácharo, v. 7, no. 1, p. 32-33, illus., **1965**.

BAILEY, EDWARD BATTERSBY, 1881-1965.

1. Charles Lyell [1797-1875]: Garden City, New York, Doubleday and Company, 214 p., illus., **1963**.

BAIN, D. M., *see* Gwinn, Vinton Edward, 1.

BAIN, GEORGE WILLIAM.

1. Climatic zones throughout the ages, in Polar wandering and continental drift: Soc. Econ. Palaeontologists and Mineralogists Spec. Pub. 10, p. 100-130, illus., **1963**. Climatic belts on the earth are proposed for each of the geologic periods, and Pennsylvania is included. The zones are based on interpretation of fossil remains.

BAIRD, DONALD.

1. Development of the Westphalian (Early Pennsylvanian) coal swamp chronofauna [abs.]: Geol. Soc. America Spec. Paper 73, p. 107-108, **1963**.
2. [Pennsylvanian] Aistopod amphibians [Beaver County] [abs.]: Geol. Soc. America Spec. Paper 82, p. 6-7, **1965**.

BALAZIK, RONALD F., *see* Deasy, George F., 4.

BALL ASSOCIATES, LTD.

1. Pennsylvania, in Surface and shallow oil-impregnated rocks and shallow oil fields in the United States: U. S. Bur. Mines Mon. 12, p. 293-295, illus., **1965**. There are no confirmed outcrops of oil-impregnated rocks in Pennsylvania, but there are 16 oilfields less than 500 feet deep, all in northwestern Pennsylvania.

BALSINGER, DANIEL FRANCIS.

1. Mississippian and Pennsylvanian cross-stratification and paleocurrents in a portion of Somerset County, Pennsylvania: MS Thesis, Univ. Pittsburgh, **1960**.

BARKER, FRANKLIN BUTT, *see* Scott, Robert Clyde, 1.

BARKSDALE, HENRY COMPTON.

1. (and Lang, Solomon Max). Ground water in the Delaware River Valley: Am. Soc. Civil Engineers Proc., v. 81, separate 593, 8 p., **1955**. This is a general summary of the rocks in the river valley area which include crystalline rocks, sedimentary rocks of the Coastal Plain, and river alluvial material. The last two are the most productive.
2. (and O'Bryan, Deric, and Schneider, William Joseph). Effect of drought on water resources in the northeast[ern United States]: U. S. Geol. Survey Hydrol. Invs. Atlas HA 243, 1 sheet, text, **1966**. Pennsylvania is included. Many small-scale maps show changes of ground-water levels during the drought of 1961-1965. The effects in Pennsylvania are very striking.

BARNES, IVAN HUGH.

1. (and Stuart, Wilbur Tennant, and Fisher, Donald William). Field investigation of mine waters in the northern anthracite field, [northeastern] Pennsylvania: U. S. Geol. Survey Prof. Papar 473B, p. B1-B8, illus., **1964**. Mine water compositions are controlled by mineral-water reactions. Oxygen-free samples were obtained from depths as little as 60 feet.

BARNETT, STOCKTON G., 3RD.

1. Conodonts of the Jacksonburg Limestone (Middle Ordovician) of north-western New Jersey and eastern Pennsylvania: MS Thesis, Univ. Iowa, **1964**; Micropaleontology, v. 11, no. 1, p. 59-80, illus., **1965**. Seventeen genera and 32 species are described and illustrated. The fauna is similar to the midcontinent conodont fauna of the same age. The exposures are near Nazareth, Portland, and Fogelsville.

BAROFFIO, JAMES RICHARD, *see also* Wanless, Harold Rollin, 2, 3.

1. Environmental mapping of the Lower Allegheny Series of the Appalachian Basin: PhD Thesis, Univ. Illinois, **1964**; [abs.], Dissert. Abs., v. 25, no. 9, p. 5210-5211, **1965**.
2. (and Wanless, Harold Rollin). Pennsylvanian environments of the Lower Allegheny Series in the Appalachian coal basin [abs.]: Geol. Soc. America Spec. Paper 87, p. 9-10, **1966**.

BARRETT, EDWARD.

1. Reconnaissance report on the northern portion of the Appalachian Basin with emphasis on the Allegheny Belt: Shale Shaker, v. 13, no. 8, p. 2-14, 16-17, illus., **1963**; Shale Shaker Digest IV, p. 259-271, illus., **1965**. A general summary of the stratigraphy and structure of the northern part of the basin includes western Pennsylvania. No new details are included.

BARTON, WILLIAM R.

1. Dimension stone: U. S. Bur. Mines Inf. Circ. 8391, 147 p., illus., [**1968**]. A general review of the occurrence and types of dimension stone includes a cursory description of the stone from Pennsylvania. Limestone, sandstone (and quartzite), granite, traprock, and slate are included.

BASS, MANUEL NATHAN, *see also* Tilton, George Robert, 1.

1. (and Davis, Gordon Leslie, and Tilton, George Robert, and Wetherill, George West). Occurrence of 1,000-million year-old minerals in eastern United States and Canada [abs.]: Geol. Soc. America Bull., v. 71, no. 12, pt. 2, p. 1822, **1960**.

BASSETT, WILLIAM AKERS, *see* Lapham, Davis Mortimer, 10.

BASSLER, HARVEY, 1882-1950.

1. A sporangiophoric lepidophyte from the Carboniferous: Bot. Gaz., v. 68, no. 2, p. 73-108, illus., **1919**. Several species of *Cantheliophorus* are reported from Pennsylvanian rocks of Luzerne, Beaver, Schuylkill, and Somerset Counties. New finds make this genus distinct from *Lepidophyllum* with which it was originally included.

BASTRON, HARRY, *see* Cannon, Helen Leighton, 1.

BATES, ROBERT GLENN.

1. Aeroradioactivity survey and areal geology of the Pittsburgh area [western] Pennsylvania, Ohio, West Virginia, and Maryland (ARMS-1): U. S. Atomic Energy Comm. Civil Effects Study CEX 59.4.12, 19 p., illus., **1966**. Aeroradioactivity contours are correlated with geological maps. Permian strata show the highest radioactivity level and those of Mississippian age the lowest. Appalachian structural trends are reflected by linear radioactivity units.
2. Natural gamma aeroradioactivity map of the Pittsburgh area, [western] Pennsylvania, Ohio, West Virginia, and Maryland: U. S. Geol. Survey Geophys. Invs. Map GP-555, scale, 1:250,000, text, **1966**. The area includes Pennsylvania south of central Mercer County and west of Punxsutawney. The contour intervals are colored at various intensities of gamma activity, most ranging from 450-600 with a small area of over 800 in Indiana County.

BAUER, JOHN W., *see* Parizek, Richard Rudolph, 2.

BAYLEY, RICHARD WILLIAM.

1. (and Muehlenberger, William Rudolf). Basement rock map of the United States: Washington, D. C., U. S. Geol. Survey, scale, 1:2,500,000, **1968**. The lithology of the basement rocks is given. Most of the state is unknown but felsic batholithic rocks are reported from Erie County, and a variety of rock types occur in southeastern Pennsylvania.

BECHER, ALBERT E., *see* Meisler, Harold, 5, 6, 7.

BECK, CHARLES BEVERLEY, *see also* Pettit, John M., 1, 2.

1. Predominance of *Arehaeopteris* in Upper Devonian flora of western Catskills and adjacent [northeastern] Pennsylvania: Bot. Gaz. v. 125, no. 2, p. 126-128, illus., **1964**. Only *Callixylon* is recognized from deltaic deposits, and from the size of the fragments, the quality of the preservation, and the abundance of the fragments, it is concluded that the coast of the Upper Devonian inland sea was probably densely forested.

BECK, MYRL EMIL, JR.

1. (and Mettiek, R. E.). Interpretation of an aeromagnetic survey in western Pennsylvania and parts of eastern Ohio, northern West Virginia, and western Maryland: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 52, 10 p., illus., **1964**. The pattern of anomalies probably originates in the basement. They trend north-northeasterly to northeasterly.
2. Paleomagnetic and geological implications of magnetic properties of the Triassic diabase of southeastern Pennsylvania: Jour. Geophys. Research, v. 70, no. 12, p. 2845-2856, illus., **1965**. A preliminary tabulation of magnetic properties suggests several correlations with lithology. The strongest but least stable magnetic moment is associated with late-stage granophyric diabase facies. The pole was at 62°N, 105°E, in Siberia.
3. The effect of magmatic differentiation on the magnetic properties of diabase sheets of southeastern Pennsylvania, *in* Geological Survey re-

search 1966: U. S. Geol. Survey Prof. Paper 550D, p. D109-D116, illus., **1966**. Specimens from six differentiated Triassic diabase sheets show a marked increase in remanent and induced magnetic intensity accompanying crystal fractionation. Passing toward felsic, the material becomes absolutely richer in iron and ferric iron.

BECKER, LEROY EVERETT.

1. Joseph M[ichael] Gorman (1910-1967): Am. Assoc. Petroleum Geologists Bull., v. 52, no 2, p. 358-359, port., **1968**.

BEEBE, BYRON WARREN.

1. (and Cornell, Lee H.) Walter August Ver Wiebe (1887-1961): Am. Assoc. Petroleum Geologists Bull., v. 46, no. 1, p. 131-133, port., **1962**.

BEERBOWER, JAMES RICHARD.

1. (and McDowell, Fred Wallace). The Centerfield biostrome—an approach to a paleoecologic problem: Pennsylvania Acad. Sci. Proc., v. 34, p. 84-91, illus., **1960**. Two types of samples were analyzed: random bulk samples and selected samples from subjectively defined units. Association of genera was inferred from field estimates and from Chi-square tests. One of the associations is of corals and bryozoans, the other principally of brachiopods. The analyses are real biological associations and not operator biased, as was considered a possibility from an earlier study.
2. Origin of cyclothems of the Dunkard Group (Upper Pennsylvanian-Lower Permian) in [southwestern] Pennsylvania, West Virginia, and Ohio: Geol. Soc. America Bull., v. 72, no. 7, p. 1029-1050, illus., **1961**. Alternating alluvial-plain and lacustrine delta-plain sediments show an asymmetric sequence of depositional environments imposed on asymmetrical cycles of clastic grain size and submergence. The origin may be due to increased competence of rivers resulting from changes in discharge rather than to sea-level changes or to regional changes in slope.
3. Morphology, paleoecology, and phylogeny of the Permo-Pennsylvanian amphibian *Diploceraspis*: Harvard Coll. Mus. Comp. Zoology Bull., v. 130, no. 2, p. 31-108, illus., **1963**. Much material comes from rocks in Greene and Washington Counties. Details of stratigraphic and geologic locations are included. Considerable morphological detail is included, and the relation of *D. burkei* and *D. conemaughensis* is described. It had a shallow lacustrine, habitat.

BEHRE, CHARLES HENRY, JR., *see* Rouse, John Thomas, 1.

BENDER, MARTIN S., 1903-1962, *see* Guilday, John E., 1.

BENNETT, GORDON DANIEL, *see also* Carswell, Louis Duncan, 1.

1. (and Patten, Eugene Paltenghi, Jr.). Borehole geophysical methods for analyzing specific capacity of multiaquifer wells: U. S. Geol. Survey Water-Supply Paper 1536-A, p. A1-A25, illus., **1960**; reprinted *as*

Pennsylvania Geol. Survey, 4th ser. Bull. W 12, 1960. An abandoned water-filled oil well in Mercer County was used as a test of a technique to measure the influence of each aquifer in a well which contains several aquifers. Data on specific capacity, thieving, and hydrostatic heads of, and by, each are shown.

BENTLEY, ROBERT D., *see* Freedman, Jacob L., 1.

BENTALL, RAY, *see* Waring, Gerald Ashley, 1.

BERDAN, JEAN MILTON.

1. The Helderberg Group and the position of the Silurian-Devonian boundary in North America: U. S. Geol. Survey Bull. 1180B, p. B1-B19, illus., **1964**. An historical summary of the ideas dealing with this group, from Conrad and Hall in the early 19th century to the present, is given. Much of the exposure is in the Commonwealth, but little of the information is derived therefrom.

BERG, DENNIS W.

1. Factors affecting beach nourishment requirements at Presque Isle Peninsula, Erie [Erie County] Pennsylvania, in Proceedings of the eighth conference on Great Lakes research: Ann Arbor, Michigan Univ. Great Lakes Research Inst., Pub. 13, p. 214-221, illus., **1965** [not seen].
2. (and Duane, David Bierlein). Effect of particle size and distribution on stability of artificially filled beach, Presque Isle Peninsula [Erie Co.], Pennsylvania, in Proceedings of the 11th conference on Great Lakes research 1968; Ann Arbor, Michigan, Internatl. Assoc. Great Lakes Research, p. 161-178, illus., **1968**. Since 1965, coarser-than-normal sand fill for the beach has resulted in stabilization of the beach and considerably less erosion.

BERGENBACK, RICHARD EDWARD, *see also* Johnson, Arvid, 1; Williams, Eugene Griffin, 6, 7, 10, 11; Weber, Jon Noel Earl, 5.

1. The geochemistry and petrology of the [Pennsylvanian] Vanport Limestone, western Pennsylvania: PhD Thesis, Pennsylvania State Univ., **1964**; [abs.], Dissert. Abs. v. 25, no. 8, p. 4647-4648, **1965**.

BERGENDAHL, MAXIMILLIAN HILMAR, *see* Koschmann, Albert Herbert, 1, 2.

BERGSTEN, JOHN M., *see also* Lytle, William Stuckley, 5, 6.

1. (and Heeren, Lillian A.). Oil and gas field atlas of the Foxburg Quadrangle, [Armstrong, Butler, Clarion, and Venango Counties] Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Spec. Bull. 9, 26 p., **1961**. Numerous maps and tabular data show various aspects of the oil and gas geology of the area. Columnar sections based on geophysical logs are included, as are much data on drilled wells.

BERMAN, BYRD L.

1. Sedimentary facies in relation to the Clinton iron ores of the eastern U. S. [abs.]: Mining Engineering, v. 13, no. 11, p. 1258, 1961; Econ. Geology, v. 56, no. 8, p. 1494-1495, **1961**.

BERNHAGEN, RALPH JOHN.

1. Wilbur [Elihu] Stout, 1876-1961: State Geologists Jour. v. 13, no. 2, p. 2, **1961**.

BERRY, FREDERICK ALMET FULGHUM, *see* Carlson, Charles Gordon, 1.

BERRYHILL, HENRY LEE, JR., *see also* Swanson, Vernon Emanuel, 1.

1. (and Swanson, Vernon Emanuel). Revised stratigraphic nomenclature for Upper Pennsylvanian and Lower Permian rocks, Washington County, Pennsylvania, in Geological Survey research 1962: U. S. Geol. Survey Prof. Paper 450C, p. C43-C46, illus., **1962**. Cycles of sedimentation with coal beds at the base, are named. The units are: Pittsburgh Formation, Pennsylvanian (includes 5 members); Uniontown Formation, Pennsylvanian (includes 2 members); Waynesburg Formation, Pennsylvanian and Permian (includes 3 members); the Washington Formation, Permian (includes 3 members), and the Greene Formation, Permian.
2. Geology of the Amity Quadrangle, [Washington and Greene Counties] Pennsylvania: U. S. Geol. Survey Geol. Quad. Maps of U. S., Map GQ 296, scale, 1:24,000, text, **1964**. Pennsylvanian, Permian, and Quaternary deposits are mapped. Structure contours on the base of the Pittsburgh coal are included. Gentle folds comprise the structure. Coal is the major mineral resource.
3. (and Schweinfurth, Stanley Paul). Geology of the Ellsworth Quadrangle, [Washington County] Pennsylvania: U. S. Geol. Survey Geol. Quad. Maps of U. S., Map GQ 333, scale, 1:24,000, text, **1964**. Pennsylvanian, Permian, and Quaternary rocks are mapped. Structure contours on the base of the Pittsburgh coal show gentle anticlines and synclines in the area. Coal, gas, and oil are the chief mineral products.
4. (and Swanson, Vernon Emanuel). Geology of the Washington West Quadrangle [Washington County] Pennsylvania: U. S. Geol. Survey Geol. Quad. Maps of U. S., Map GQ 283, scale, 1:24,000, text, **1964**. Pennsylvanian, Permian, and Quaternary rocks are mapped. Coal and clay are the major mineral resources. Structure contours on the Pittsburgh coal are included.
5. (and Swanson, Vernon Emanuel). Revised stratigraphic nomenclature for Upper Pennsylvanian and Lower Permian rocks, Washington County, Pennsylvania, in Stratigraphy of the Pennsylvanian and Permian rocks of Washington, Mercer, and Lawrence Counties, Pa.—Field Conf. Pennsylvania Geologists, 30th: Harrisburg, Pennsylvania Bur. Topog. Geol. Survey and U. S. Geol. Survey, p. 7-10, illus., **1965**.
6. Allegheny region, Chapter A in Paleotectonic investigations of the Permian System in the United States: U. S. Geol. Survey Prof. Paper 515, p. 1-7, illus., **1967**. A detailed description of the Permian rocks in the Dunkard basin is followed by an evaluation of the sedimentary

environment (terrestrial swamps and fluvial delta plains) and source areas (rising land to the north and southeast).

7. Late Paleozoic tectonism in eastern United States as indicated by Lower Permian rocks in the Allegheny region in Paleotectonic maps of the Permian System: U. S. Geol. Survey Misc. Geol. Invs. Map. I-450, text p. 33-36, **1967**. The Dunkard Group rocks are analyzed with a view toward determining the tectonic events of the Permian. They were never thousands of feet thick, however, though erosion has altered them since deposition. The Pennsylvanian-Permian boundary cannot be determined precisely in the Dunkard Basin.

BERTINE, KATHE K., *see* Kharkar, D. P., 1.

BESANCON, JAMES, *see* Armstrong, Richard Lee, 1.

BEUTNER, EDWARD CHANDLER.

1. (and Flueckinger, Linda A., and Gard, Theodore M.). Bedding geometry in a [Clearfield County] Pennsylvanian channel sandstone: Geol. Soc. America Bull., v. 78, no. 7, p. 911-916, illus., **1967**. Cross-bedded sandstone in the Kittanning Sandstone near Phillipsburg consists of large, inclined, sigmoid sedimentation units that overlap each other uniformly toward the west. The sand is the result of deposition on the inside of a meander curve of a westwardly migrative stream channel.

BHARADWAJ, DINEST CHANDRA.

1. Sporological evidence on the boundaries of the stratigraphical subdivisions in the Upper Pennsylvanian strata of Europe and North America: Quatrième congrès pour l'avancement des études de stratigraphie et de géologie du Carbonifère Compte Rendu, v. 1, p. 33-39, **1960**. The major variations in spore assemblages correspond with the major variations in the plant megafossil assemblages. The various subdivisions are recognized and compared with well-established European subdivisions.

BIANCULLI, ARTHUR.

1. Spider cave, Westmoreland County . . . : Netherworld News, v. 10, no. 11, p. 217-218, illus., **1962**.
2. . . . Wright's Cave . . . Fayette County: Netherworld News, v. 10, no. 1, p. 10-11, illus., **1962**.

BIEMESDERFER, GEORGE K.

1. (and Leske, R. H.). Ground water control at Grace mine [Berks County]: Mining Cong. Jour., v. 47, no. 10, p. 39-44, illus., **1961**. Geological factors influencing ground water control during the sinking of the mine shaft are described. The shaft was sunk into a cone of depression created by numerous large-capacity wells. Continued pumping has reduced the amount of water entering the finished mine.

BIESECKER, J. E.

1. (and Lescinsky, J. B., and Wood, Charles R.). Water resources of the Schuylkill River Basin: Pennsylvania Dept. Forests and Waters [Bull.

3], 198 p., illus., **1968**. Included is a generalized description of the occurrence of ground water and the influence of structures and lithology on the availability and quality of the water in the river basin.

BILLINGS, MARLAND PRATT.

1. Diastrophism and mountain building: Geol. Soc. America Bull., v. 71, no. 4, p. 363-398, illus., **1960**. A general discussion of the types of diastrophism and their relation to mountain building includes a description of the origin of the Valley and Ridge province in the Commonwealth. It is the result of gravity sliding from an eastern-upraised source.

BIRCH, ALBERT FRANCIS.

1. Reginald Aldworth Daly (1871-1957): Am. Philos. Soc. Yearbook 1959, p. 106-116, **1960**.
2. Reginald Aldworth Daly, May 19, 1871-September 19, 1957: Natl. Acad. Sci. Biog. Mem., v. 34, p. 31-64, port., **1960**.

BIRGE, GEORGE W.

1. (and Wolfson, David E.). Carbonizing properties of Butler County, Pa., coals: U. S. Bur. Mines Rept. Invs. 5927, 12 p., illus., **1962**. Proximate and ultimate analyses are included among many other types of analyses of properties.
2. (and Wolfson, David E., and Lynch, J. H., Jr.). Carbonizing properties of coals from Elk, Clarion, Jefferson, Clearfield, and Centre counties, Pa.: U. S. Bur. Mines Rept. Invs. 6261, 22 p., illus., **1963**.

BITZ, SISTER MARY CAROL.

1. (and Nagy, Bartholomew Stephen). Mass spectrographic analysis of coal and kerogen [abs.]: Geol. Soc. America Spec. Paper 101, p. 18, **1968**.

BIVINS, DORIS.

1. (and Ergun, Sabri). Magnetic susceptibilities of coals: Science, v. 159, no. 3810, p. 83, illus., **1968**. Seven coals, two from Pennsylvania, are included. The coals have diamagnetic susceptibilities approximating 0.5×10^{-6} cm-gm-sec unit. Only anthracite (from Luzerne County) shows significant magnetic anisotropy.

BIZAL, ROBERT T.

1. Natural-gas storage capacity jumps 12%: Oil and Gas Jour., v. 58, no. 22, p. 89-94, illus., **1960**. The location and capacity of actual and potential gas storage areas, mostly anticlines in used-up gas fields, are given in tables. Pennsylvania has more than any other state.

BLACKWELDER, ELIOT.

1. Bailey Willis, May 31, 1857-February 19, 1949: Natl. Acad. Sci. Biog. Mem., v. 35, p. 333-350, port., 1961.

BLANKENSHIP, REGINALD R., *see* Waring, Gerald Ashley, 1.

BLUMENSTEIN, MARK.

1. Maranga Cave (Bucks County, Pennsylvania): Philadelphia Grotto Digest, v. 3, no. 1, p. 63, illus., 1964; Speleo Digest 1964, p. 17, 19, illus., 1966.

BOCK, WILHELM.

1. New fresh water algae of the eastern American Triassic: Pennsylvania Acad. Sci. Proc., v. 35, p. 77-81, illus., 1961. *Gloeotrichata hexagonis* and *Diploparundus rugosus* from the Lockatong Formation near Gwynned, Montgomery County, are described and illustrated.
2. A study on fossil *Isoetes* [York County]: Jour. Paleontology, v. 36, no. 1, p. 53-59, illus., 1962. *Isoetes gramineoides* (Ward) from the Triassic New Oxford Formation in York County is described and illustrated.
3. Permian and Triassic [reptile] tracks [southeastern Pennsylvania] [abs.]: Pennsylvania Acad. Sci. Proc., v. 38, no. 1, p. 16, 1964.
4. The American Triassic flora and global distribution: Geol. Center Research Ser., v. 3 and 4, 406 p., illus., 1969. A general introduction to the principles of dichotomy in reference to paleobotanical work is followed by a review of Triassic paleobotany. Many examples are from southeastern Pennsylvania. World wide correlations are proposed.

BODE, HANS.

1. Die floristischen Verhaeltnisse an der Westfal/Stefan-Grenze im europaeischen und US-amerikanischen Karbon: Quatrième congrès pour l'avancement des études de stratigraphie et de géologie du Carbonifère Compte Rendu, v. 1, p. 49-56, illus., 1960; discussion, p. 56-58. *Neuropteris ovata* is used as a guide to the recognition of the Westphalian-Stephanian boundary throughout the world. The top of the zone would fall within the Permian Dunkard Group and the bottom is at the Pottsville-Allegheny boundary in southwestern Pennsylvania.

BOEKENKAMP, RICHARD P., *see* Moss, John Hall, 1.

BOFINGER, V. M.

1. (and Compston, W. A.). A reassessment of the age of the Hamilton Group, New York and [western] Pennsylvania, and the role of inherited radiogenic Sr-87: Geochim et Cosmochim. Acta., v. 31, no. 12, p. 2353-2359, illus., 1967. Statistical analyses of Rb-Sr data show that the age can be more than adequately represented by two parallel isochrons instead of the conventional one. The age of the Hamilton Group is 384 ± 9 to 377 ± 11 my.

BONINI, WILLIAM EMORY.

1. Bouguer gravity anomaly map of New Jersey: New Jersey Geol. Survey Geol. Rept. Ser., no. 9, scale, 1:250,000, 10 p., text, **1965**. A portion of eastern Pennsylvania, along the Delaware River, is included.

BOSCART, R. C.

1. [Map of] Dulany Cave, Fayette County: York Grotto Newsletter, v. 1, no. 4, p. 28-29, **1959**.

BOSSART, PAUL NATHANIEL, JR., *see* Patterson, Samuel Oliver, 1.

BOTTINO, MICHAEL LOUIS, *see* Fullagar, Paul David, 1.

BOUCOT, ARTHUR JAMES, *see also* Pavlides, Louis, 1.

1. Appalachian Siluro-Devonian, *in* Some aspects of the Varsican Fold Belt: Manchester, England, Manchester Univ. Press, p. 155-163, illus., **1962**. A general discussion of the Silurian and Devonian rocks includes much generalized data from Pennsylvania. An elongated belt of islands is postulated as the source of the clastic material. The relations of marine and non-marine rocks to the bounding unconformities is also described.
2. Early Devonian brachiopod zoogeography [abs.]: Geol. Soc. America Spec. Paper 87, p. 15-16, **1966**.
3. (and Johnson, John Granville). Appalachian Province Early Devonian paleogeography and brachiopod zonation, *in* Internatl. symposium on the Devonian System, v. 2: Calgary, Alberta Soc. Petroleum Geologists, p. 1255-1267, illus., **1967**. Small-scale maps show the paleogeography and brachiopod-distribution in the eastern United States, including Pennsylvania. Brachiopod genera are listed with their vertical and horizontal distribution.
4. (and Johnson, John Granville, and Talent, John A.). Lower and Middle Devonian faunal provinces based on brachiopods, *in* Internatl. symposium on the Devonian System, v. 2: Calgary, Alberta Soc. Petroleum Geologists, p. 1239-1254, illus., **1967**. The faunal provinces which engulf Pennsylvania are included in this world-wide survey. Pennsylvania is in the Appalachian Province; the typical brachiopod genera present during each interval are listed.
5. (and Johnson, John Granville). Paleogeography and correlation of Appalachian Province Lower Devonian sedimentary rocks, *in* Symposium—Silurian-Devonian rocks of Oklahoma and environs: Tulsa Geol. Soc. Digest, v. 35, p. 35-87, illus., **1967**. The Lower Devonian rocks of Pennsylvania are included in a survey of the Lower Devonian of the entire Appalachian trough. Small-scale paleogeographic maps are included. Various faunal communities and their distributions are also included, as are brachiopod lists.
6. (and Johnson, John Granville). Brachiopods of the Bois Blanc Formation in New York: U. S. Geol. Survey Prof. Paper 584B, p. B1-B27, illus., **1968**. A brief description of the Shoharie-aged lithofacies of the eastern United States includes a quartz-rich band passing from the northeast corner southwestward through central Pennsylvania. The rest of the state is in the limestone-chert lithofacies.

7. (and Harper, Charles Woods, Jr.). Silurian to Lower Middle Devonian Chonetacea: Jour. Palontology, v. 42, no. 1, p. 143-176, illus., 1968. *Eodevonaria elymencheri*, new species, from the Hazard Limestone [Carbon County] is described and illustrated along with many others from other places in the state and elsewhere around the world.

BOURQUARD, GEIL, AND ASSOCIATES, INC.

1. Report on water resources study of Codorus Creek basin and vicinity [York County]: Harrisburg, Pennsylvania Dept. Forests and Waters [160 p.], illus., 1962. A general development plan for the basin (60% of the county) includes geologic, geomorphic, and ground water availability descriptions.

BOWEN, RICHARD LEE.

1. Volcanic events of the Middle Ordovician in eastern North America [abs.]: Am. Geophys. Union Trans., v. 48, no. 1, p. 226, 1967.

BOWEN, ZEDDIE PAUL.

1. Brachiopod fauna and age of the Keyser Limestone of Maryland and adjacent areas [abs.]: Geol. Soc. America Spec. Paper 76, p. 19, 1964.
2. Brachiopods and stratigraphy of the Elbow Ridge Sandstone (Lower Devonian of [south central] Pennsylvania, Maryland, and West Virginia; Jour. Paleontology, v. 40, no. 5, p. 1051-1062, illus., 1965. Twelve species of articulate brachiopods are described and illustrated. The sandstone is a beach or bar sand facies and is correlated with the Kalkberg Formation in New York and the New Creek Limestone of Maryland.
3. Intraspecific variations in the brachial cardinalia of *Atrypa reticularis*: Jour. Paleontology, v. 40, no. 5, p. 1017-1022, illus., 1966. Specimens with abnormal cardinalia are shown to grade completely with those with normal cardinalia. Some are from the Silurian Keyser Limestone of central Pennsylvania.
4. Brachiopoda of the Keyser Limestone (Silurian-Devonian) of Maryland and adjacent areas: Geol. Soc. America Mem. 102, 103 p., illus., 1967. Numerous species from many places in central Pennsylvania are included. The Keyser Limestone is considered Silurian and Devonian in age. Two zones, a lower *Eccentricosta jerseyensis* zone and an upper *Meristella praenuntia* zone, are recognized.

BOWKER, DAVID EDWIN.

1. Remanent magnetization of eastern United States Triassic rocks: PhD Thesis, Massachusetts Inst. Technology, 1961.

BOYNTON, GEORGE R.

1. (and Pittillo, D. R., and Zandle, Gerald L.). Aeromagnetic map of parts of the Lambertville, Lumberville, and Stockton Quadrangles, New Jersey and [Bucks County] Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 553, scale, 1:24,000, 1966.
2. (and Pittillo, D. R., and Zandle, Gerald L.). Aeromagnetic map of the Bangor Quadrangle, New Jersey and [Northampton County] Penn-

sylvania: U. S. Geol. Survey Geophys. Invs. Map GP 549, scale, 1:24,000, **1966.**

3. (and Pittillo, D. R., and Zandle, Gerald L.). Aeromagnetic map of the Belvidere Quadrangle, New Jersey and [Northampton County] Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 550, scale, 1:24,000, **1966.**
4. (and Pittillo, D. R., and Zandle, Gerald L.). Aeromagnetic map of the Bloomsbury and part of the Easton Quadrangles, New Jersey and [Northampton County] Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 551, scale, 1:24,000, **1966.**
5. (and Pittillo, D. R., and Zandle, Gerald L.). Aeromagnetic map of the Frenchtown and part of the Riegelsville Quadrangles, New Jersey and [Bucks and Northampton Counties] Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 552, scale, 1:24,000, **1966.**
6. (and Pittillo, D. R., and Zandle, Gerald L.). Natural gamma aeroradioactivity map of parts of the Lambertville, Lumberville, and Stockton Quadrangles, New Jersey and [Bucks County] Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 572, scale, 1:24,000, **1966.**
7. (and Pittillo, D. R., and Zandle, Gerald L.). Natural gamma aeroradioactivity map of the Bangor Quadrangle, New Jersey and [Northampton County] Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 568, scale, 1:24,000, **1966.**
8. (and Pittillo, D. R., and Zandle, Gerald L.). Natural gamma aeroradioactivity map of the Belvidere Quadrangle, New Jersey and [Northampton County] Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 569, scale, 1:24,000, **1966.**
9. (and Pittillo, D. R., and Zandle, Gerald L.). Natural gamma aeroradioactivity map of the Bloomsbury and part of the Easton Quadrangles, New Jersey and [Northampton County] Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 570, scale, 1:24,000, **1966.**
10. (and Pittillo, D. R., and Zandle, Gerald L.). Natural gamma aeroradioactivity map of the Frenchtown and part of the Riegelsville Quadrangles, New Jersey and [Bucks and Northampton Counties] Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 571, scale, 1:24,000, **1966.**

BOZION, CONSTANTINE N., *see* Heyl, Allen Van, Jr., 1.

BRADLEY, WILMOT HYDE.

1. Esper Signius Larsen, 3d (1912-1961): Geol. Soc. America Bull., v. 73, no. 4, p. P35-P37, port., **1962.**

BRADY, GEORGE A.

1. (and Griffiths, H. H.). Properties of anthracite from the Bottom Ross bed [northeastern Pennsylvania]: U. S. Bur. Mines Rept. Invs. 7086, 29 p., illus., **1968.** Proximate and ultimate analyses of many samples of this bed from many places in the Northern Field are included.

BRANSON, CARL COLTON.

1. Pennsylvanian System of central Appalachians, *in* Pennsylvanian System in the United States—A symposium: Tulsa, Oklahoma, Am. Assoc. Pe-

troleum Geologists, p. 97-116, illus., **1962**. A complete but general summary of Pennsylvanian stratigraphy, sedimentation, and economic geology is given. The immediate pre- and post-Pennsylvanian rocks are also included. Small-scale isopach maps of the various units are included.

BRA TT, JUDY M., *see* Swain, Frederick Morrill, Jr., 6, 7.

BRAUN, EMMA LUCY, 1889-1971.

1. Deciduous forests of eastern North America: Philadelphia, Blakiston Company, 596 p., illus., **1950**. A discussion of the Pleistocene paleobotanical record of the forests of the eastern United States includes allusions to Pennsylvania.
2. Plant distribution in relation to the glacial boundary, *in* The glacial border—climatic, soil, and biotic features: Ohio Jour. Sci., v. 51, no. 3, p. 139-146, illus., **1951**. The distribution of numerous plants, many from western Pennsylvania, are interpreted to show that the deciduous forest zone, though narrowed, maintained itself on the Appalachian Plateau during the glacial advances.

BREISCH, RICHARD L.

1. (and Nelson, Richard). Fox Cave . . . Centre County: Nittany Grotto News, v. 13, no. 6, p. 116-117, illus., **1965**.
2. Millheim no. 1, 2 and Woodward no. 2, 3, 4 Caves . . . Centre County: Nittany Grotto News, v. 13, no. 6, p. 115, illus., **1965**.
3. Raccoon Cave . . . Centre County: Nittany Grotto News, v. 13, no. 6, p. 116-117, illus., **1965**.

BRETSKY, PETER WILLIAM, JR., *see also* Bretsky, Sara S., 1.

1. Autecology of Late Ordovician Appalachian Bivalvia [abs.]: Geol. Soc. America Spec. Paper 115, p. 22-23, **1968**.
2. Bryozoan ecology and sedimentary environments in central Appalachian Upper Ordovician [abs.]: Am. Assoc. Petroleum Geologists Bull., v. 52, no. 3, p. 521, **1968**.
3. (and Flessa, K. Walter, and Bretsky, Sara S.). Brachiopod ecology in the Ordovician of eastern Lehigh and Berks Counties, Pennsylvania: Jour. Paleontology, v. 43, no. 2, p. 312-321, illus., **1969**. The brachiopods in the Shochary Ridge Sandstone are studied with emphasis on their distribution and ecology. Most are orthids and strophomenids, and each dominates a distinct, geographically identifiable population. They lived in a quiet water shelf environment.
4. Central Appalachian Late Ordovician communities: Geol. Soc. America Bull., v. 80, no. 2, p. 193-212, illus., **1969**. The fossiliferous beds at the top of the Reedsville and Martinsburg Formations contain three distinct communities. About 35 species are abundant, and make up the *Sowerbyella-Onniella* muddy silt community and the *Orthorhynchula-Ambonychia* community on sandy silt bottoms. The former is more widespread in central Pennsylvania.

5. Upper Ordovician ecology of the central Appalachians: PhD Thesis, Yale Univ., **1968**; [abs.], Dissert. Abs. B, v. 29, no. 11, p. B4223-B4224, **1969**.

BRETSKY, SARA S., *see also* Bretsky, Peter William, Jr., 3.

1. (and Flessa, K. Walter, and Bretsky, Peter William, Jr.). Zoogeography and synecology of a Late Ordovician brachiopod community (central Appalachians) [abs.]: Geol. Soc. America Spec. Paper 115, p. 23, **1968**.

BREW, DOUGLAS CROCKER.

1. Stratigraphy of the Upper Devonian Fall Creek Conglomerate in northern Pennsylvania and southern New York: MA Thesis, Cornell Univ., **1963**.

BRICKER, OWEN PETER, JR.

1. Ordovician volcanics of the Bunker Hills, Lebanon County, Pennsylvania, in Some tectonic and structural problems of the Appalachian Piedmont along the Susquehanna River: Field Conf. Pennsylvania Geologists, 25th: Lancaster, Franklin and Marshall College, p. 92-97, illus., **1960**. Diorite which has intruded into the Martinsburg Formation is described. A stratigraphic section which includes several basalt members is included, as are some generalized petrographic descriptions. Faults intersect the northwest trending pattern of the region.

BRIDGENS, H. F.

1. Atlas of Lancaster County, Pennsylvania: Philadelphia, H. F. Bridgens, **1864** [not seen].
2. Atlas of Chester County, Pennsylvania: Safe Harbor, Lancaster County, A. R. Witmer, **1873** [not seen].

BRIGGS, LOUIS IRVING, *see* Alling, Harold Lattimore, 1.

BRIGHAM, WILLIAM TUFTS, 1841-1926.

1. Volcanic manifestations in New England, being an enumeration of the principal earthquakes from 1638 to 1869: Boston Soc. Nat. Hist. Mem. 2, p. 1-28; [**1871**]. Early accounts of earthquakes include some reported from the Philadelphia area, the first being in 1783.

BRINDLEY, GEORGE WILLIAM, *see* Thompson, T. D., 1.

BRINKLEY, CHARLES A.

1. Glacial geology of northern Montour and Northumberland Counties, Pennsylvania, between North and West Branches of Susquehanna River: MS Thesis, Pennsylvania State Univ., **1960**.

BRISON, DAVID N., *see also* Gettel, Phillip E. A., 4.

1. Frustration Pit [Cave] . . . Franklin County, Pa.: York Grotto Newsletter, v. 10, no. 5, p. 66-70, illus., **1969**.

BROBST, DONALD ALBERT.

1. Barite in the United States, exclusive of Alaska and Hawaii: U. S. Geol. Survey Mineral Invs. Resource Map MR-43, scale, 1:3,168,000, separate text, **1965**. Barite occurrences in Bucks, Franklin and Fulton Counties are noted.

BROCK, MAURICE REX, *see also* Zartman, Robert Eugene, 2.

1. (and Heyl, Allen Van, Jr.). Post-Cambrian igneous rocks of the central craton, western Appalachian Mountains and Gulf Coastal Plain of the United States, *in* Geological Survey research 1961: U. S. Geol. Survey Prof. Paper 424D, p. D33-D35, illus., **1961**. A small-scale map shows such occurrences in Pennsylvania and elsewhere. The small peridotite dikes in western Pennsylvania, and the basaltic rocks in Ordovician terrane in the Great Valley are shown. They may be mantle differentiates.

BROMERY, RANDOLPH WILSON.

1. (and Zandle, Gerald L., and others). Aeromagnetic map of part of the Ambler Quadrangle, Montgomery and Bucks Counties, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 265, scale, 1:24,000, **1960**.
2. (and Zandle, Gerald L., and others). Aeromagnetic map of part of the Bedminster Quadrangle, Bucks County, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 260, scale, 1:24,000, **1960**.
3. (and Zandle, Gerald L., and others). Aeromagnetic map of part of the Doylestown Quadrangle, Bucks and Montgomery Counties, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 263, scale, 1:24,000, **1960**.
4. (and Henderson, John Richard, Sr., and Zandle, Gerald L., and others). Aeromagnetic map of part of the Easton Quadrangle, Northampton County, Pennsylvania, and Warren County, New Jersey: U. S. Geol. Survey Geophys. Invs. Map GP 235, scale, 1:24,000, **1960**.
5. (and Henderson, John Richard, Sr., and Zandle, Gerald L., and others). Aeromagnetic map of part of the Hatboro Quadrangle, Bucks, Montgomery and Philadelphia Counties, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 237, scale, 1:24,000, **1960**.
6. (and Zandle, Gerald L., and others). Aeromagnetic map of part of the Lumberville Quadrangle, Bucks County, Pennsylvania, and Hunterdon County, New Jersey: U. S. Geol. Survey Geophys. Invs. Map GP 261, scale, 1:24,000, **1960**.
7. (and Henderson, John Richard, Sr., and Zandle, Gerald L., and others). Aeromagnetic map of part of the Riegelsville Quadrangle, Bucks and Northampton Counties, Pennsylvania, and Hunterdon and Warren Counties, New Jersey: U. S. Geol. Survey Geophys. Invs. Map GP 236, scale, 1:24,000, **1960**.
8. (and Zandle, Gerald L., and others). Aeromagnetic map of part of the Unionville Quadrangle, Chester County, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 226, scale, 1:24,000, **1960**.
9. (and Henderson, John Richard, Sr., and Zandle, Gerald L., and others). Aeromagnetic map of the Birdsboro Quadrangle, Berks County, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 231, scale, 1:24,000, **1960**.

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35. (and Zandle, Gerald L., and others). Aeromagnetic map of the Biglerville Quadrangle, Adams County, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 279, scale, 1:24,000, **1961**.
36. (and Zandle, Gerald L., and others). Aeromagnetic map of the Columbia East Quadrangle, Lancaster County, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 258, scale, 1:24,000, **1961**.

37. (and Zandle, Gerald L., and others). Aeromagnetic map of the Ephrata Quadrangle, Lancaster County, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 241, scale, 1:24,000, **1961.**
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39. (and Natoff, Nora Carol, and others). Aeromagnetic map of the Gettysburg Quadrangle and part of the Taneytown Quadrangle, Adams County, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 284, scale, 1:24,000, **1961.**
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46. (and Zandle, Gerald L., and others). Aeromagnetic map of the Lititz Quadrangle, Lancaster and Lebanon Counties, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 257, scale, 1:24,000, **1961.**
47. (and Zandle, Gerald L., and others). Aeromagnetic map of the Manheim Quadrangle, Lancaster and Lebanon Counties, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 256, scale, 1:24,000, **1961.**
48. (and Natoff, Nora Carol, and Zandle, Gerald L., and others). Aeromagnetic map of the McSherrystown Quadrangle, and part of the Littlestown Quadrangle, Adams County, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 285, scale, 1:24,000, **1961.**
49. (and Natoff, Nora Carol, and others). Aeromagnetic map of the Middletown Quadrangle, Dauphin, Lancaster, Lebanon, and York Counties, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 269, scale, 1:24,000, **1961.**
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53. (and Zandle, Gerald L., and others). Aeromagnetic map of the Richland Quadrangle, Lancaster and Lebanon Counties, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 255, scale, 1:24,000, **1961**.
54. (and Natoff, Nora Carol, and others). Aeromagnetic map of the Seven Valleys Quadrangle and part of the Lineboro Quadrangle, York County, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 287, scale, 1:24,000, **1961**.
55. (and Zandle, Gerald L., and others). Aeromagnetic map of the Sinking Spring Quadrangle, Berks and Lancaster Counties, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 240, scale, 1:24,000, **1961**.
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57. (and Zandle, Gerald L., and others). Aeromagnetic map of the West York Quadrangle, York County, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 282, scale, 1:24,000, **1961**.
58. (and Zandle, Gerald L., and others). Aeromagnetic map of the Womelsdorf Quadrangle, Berks, Lebanon, and Lancaster Counties, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 239, scale, 1:24,000, **1961**.
59. (and Zandle, Gerald L., and others). Aeromagnetic map of the York Quadrangle, York County, Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 270, scale, 1:24,000, **1961**.
60. Preliminary interpretation of aeromagnetic data in the Allentown Quadrangle, Pennsylvania, in *Structure and stratigraphy of the Reading Hills and Lehigh Valley in Northampton and Lehigh Counties, Pennsylvania—Field Conf. Pennsylvania Geologists 26th: Bethlehem, Lehigh Univ., p. 36-40, illus., 1961*.
61. (and Griscom, Andrew). Aeromagnetic and generalized geologic map of southeastern Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 577, 2 sheets, scale, 1:125,000, text, **1967**. The geologic map is divided into Precambrian (3 units), Lower Paleozoic(?) (2 units), Lower Paleozoic (1 unit), and Triassic (2 units). Magnetic contours of 50 gammas are included. A brief text summarizes the interpretations of the anomalies in each of the rock terrains.

BROOM, ROBERT, 1866-1951.

1. On the origin of the *Cheiropterygium*: *Am. Mus. Nat. Hist. Bull.*, v. 32, p. 459-464, illus., 1913; *Anat. Anzeiger*, v. 45, p. 72-78, illus., **1913**. Fragments of *Saurpterus taylori*, from Devonian rocks in Tioga County, are illustrated with a view toward showing the limb of this fish as being a possible precursor to that of amphibians. A cross section of a labyrinthodont tooth is included.

BROUGHTON, PAUL.

1. Minerals of the Lehigh Quarry [Lehigh County]: Rocks and Minerals, v. 41, no. 8, p. 576-578, illus., **1966** [not seen].
2. Calcite scalenohedrons: Earth Science, v. 19, no. 6, p. 256-257, illus., **1966**. Calcite scalenohedrons are described and illustrated. They are from the Thomasville quarry in York County.
3. Collecting the minerals of southern Pennsylvania: Rocks and Minerals, v. 41, no. 3, p. 169-172, illus., **1966**. This is a popular account of quarry locations and mineral collecting possibilities in southeastern Pennsylvania.

BROWN, ALLAN.

1. Agony Cave, Berks County: York Grotto Newsletter, v. 7, no. 5, p. 75, illus., **1965**.

BROWN, ANDREW.

1. Geology and the Gettysburg [Adams County] campaign: GeoTimes, v. 6, no. 1, p. 8-12, 40-41, illus., **1961**; Pennsylvania Geol. Survey, 4th ser. Educ. Ser. no. 5, 15 p., illus., [**1962**]. A general description of the geology of the region (largely Triassic sedimentary rocks and diabase) is given to show the influence of geology upon troop movements during the campaign.

BROWN, DAVID ALEXANDER, *see* Irving, Edward, 1.

BROWN, ERIC H.

1. Britain and Appalachia—A study in the correlation and dating of planation surfaces, in Transactions and papers 1961: Inst. British Geographers Pub. 29, p. 91-100, illus., **1961**. The Harrisburg and Schooley planation surfaces are compared with similarly-developed surfaces in England on the basis of elevations and marine deposits therefrom.

BROWN, GEORGE MALCOLM, *see* Norton, Dorita Anne, 1.

BROWN, JOHN STAFFORD.

1. (and Meyer, Pierrepont Arthur, Jr.). Geochemical prospecting as applied by the St. Joseph Lead Company, in Symposium de exploracion geo-quimica, v. 3: Mexico, 20th Internatl. Geol. Cong., p. 623-639, illus., **1960**. An unidentified area, probably in southeastern Pennsylvania, was used as a test of the method for analyzing soil for the presence of zinc in potentially valuable concentrations. It was feasible and was then tested in other areas also.

BROWN, PHILIP MONROE, *see* Gill, Harold Edward, 1.

BROWN, RICHARD WILLITS.

1. (and Spalding, Charles W.). Deep-well disposal of spent hardwood pulping liquors [Erie County]: Water Pollution Control Federation Jour., v. 38, no. 12, p. 1916-1924, illus., **1966** [not seen].

BROWN, WILLIAM RANDALL, 3RD.

1. Appalachian spotlight—central Pennsylvania: Producers Monthly, v. 24, no. 8, p. 12, **1960**; v. 25, no. 3, p. 21, **1961**; no. 4, p. 19, **1961**. Brief descriptions of geological data are given in this otherwise drilling activity report.
2. Appalachian spotlight—Lower Paleozoic of [western] Pennsylvania: Producers Monthly, v. 24, no. 9, p. 10, **1960**. A review of deep drilling activity in western Pennsylvania includes a little geological data.
3. Appalachian spotlight—northwestern Pennsylvania: Producers Monthly, v. 24, no. 4, p. 14-16, **1960**. This scouting report on drilling activity includes some geological information gleaned from some of the wells.
4. Appalachian spotlight—Punxsutawney-Driftwood area [Jefferson County]: Producers Monthly, v. 24, no. 7, p. 8, **1960**. A review of drilling activity includes a small amount of geological information.
5. Appalachian spotlight—recent Silurian successes in northwestern Pennsylvania: Producers Monthly, v. 24, no. 11, p. 8, **1960**. A review of deep drilling in the region includes a small bit of geological information.
6. Appalachian spotlight—successful wildcats in southwestern Pennsylvania: Producers Monthly, v. 25, no. 11, p. 28-29, **1960**. A scouting report on drilling activity includes brief references to geological data.
7. Northeastern Pennsylvania [review]: Producers Monthly, v. 24, no. 3, p. 12-13, illus., **1960**. A scouting report on deep drilling into the Devonian includes very brief geological descriptions.
8. Appalachian spotlight—central and eastern Pennsylvania: Producers Monthly, v. 25, no. 7, p. 20, **1961**; v. 26, no. 4, p. 17; no. 8, p. 16; no. 12, p. 23, **1962**; v. 27, no. 7, p. 16; no. 11, p. 16, **1963**; v. 30, no. 1, p. 22; no. 6, p. 12; no. 8, p. 26-27; no. 10, p. 9, **1966**; v. 31, no. 2, p. 15; no. 5, p. 12, **1967**. In a reference to drilling and production activity in the region, a small amount of geological information is included.
9. Appalachian spotlight—Clearfield and Jefferson Counties: Producers Monthly, v. 25, no. 6, p. 18, **1961**. A summary of drilling activity in the area includes a small amount of geological information.
10. Appalachian spotlight—Pennsylvania: Producers Monthly, v. 25, no. 1, p. 14-15, **1961**. A review of drilling activity in the state includes cursory references to geological information from some of the wells.
11. Appalachian spotlight—western Pennsylvania: Producers Monthly, v. 25, no. 9, p. 21, **1961**; v. 26, no. 2, p. 13-14; no. 6, p. 22; no. 10, p. 11, **1962**; v. 27, no. 2, p. 15; no. 9, p. 19; no. 10, p. 11-12, **1963**; v. 30, no. 5, p. 24; no. 9, p. 24; no. 11, p. 27, **1966**; v. 31, no. 3, p. 20; no. 6, p. 11, **1967**. Brief scouting reports on drilling and production practice in the area include a small amount of geological information.

BROWNFIELD, JAMES.

1. The peridotite dike of Fayette and Greene Counties, Pennsylvania [abs.]: West Virginia Acad. Sci. Proc. **1968**, v. 40, p. 235-236, **1968**.

BRUNDAGE, HARRISON TRUESDALE.

1. Many operators entering Appalachian Basin: World Oil, v. 150, no. 4, p. 93-99, illus., **1960**. A general discussion of the occurrence of oil and gas in the Appalachian Basin includes western Pennsylvania. The emphasis is placed upon new types of occurrences in old areas, especially in the chert units of the Devonian Oriskany and Onondaga Formations.

BRUNNSCHWEILER, DIETER HEINZ.

1. Die Pleistozäne Periglazialbereich in Nordamerika: Zeitschr. Geomorphologie, new ser. v. 8, no. 2, p. 223-231, illus., **1964**. The presence of boulder fields, frost wedging, and depressions of various sorts in Pennsylvania, along with periglacial phenomena from other states, are used to suggest that Pennsylvania was tundralike during the Pleistocene.

BRUSH, GRACE S.

1. The absence of pollen and spores in some Triassic sediments: Jour. Paleontology, v. 40, no. 5, p. 1241-1243, **1966**. The Brunswick Formation from southeastern Pennsylvania yielded no pollen or spores nor did most Triassic rock samples from elsewhere. No certain explanation is known.

BRUSH, LUCIEN MUNSON, JR.

1. Drainage basins, channels, and flow characteristics of selected streams in central Pennsylvania: U. S. Geol. Survey Prof. Paper 282 F, p. 145-181, illus., **1961**. Sixteen streams were studied. An indirect computation of downstream hydraulic geometry is applied to show that the measurement of stream parameters are similar to those obtained by direct methods. All are in Susquehanna drainage.

BUCK, WILLIAM JOSEPH.

1. Early accounts of petroleum in the United States: Titusville, Pa., Blossard Cogewell, 12 p., **1876**. Petroleum is first reported in Pennsylvania in an account by a Jesuit named Charlevoix in 1721. Other Frenchmen visited the region before the British expelled them. Numerous accounts in various journals, diaries and books are described before petroleum was drilled for in 1859.

BUCKWALTER, TRACY VERE, JR., *see also* Geyer, Alan Raymond, 1.

1. Some structural aspects of the Reading Hills [Berks County]: Pennsylvania Acad. Sci. Proc., v. 34, p. 109-116, illus., **1960**. Repetitions of linear trends of the overturned Cambrian Hardyston Quartzite are interpreted in seven different possible ways. The preferred one is of overturned synclines with the north limbs sheared out.

2. The Precambrian geology of the Reading 15' Quadrangle [Berks County]: Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 161, 49 p., illus. incl. geol. map, **1962**. The oldest rocks are metasedimentary graphitic gneiss, quartz-biotite-feldspar gneiss, and hornblende gneiss. Granitic gneiss and migmatites are widespread. The Cambrian Hardyston is included in the discussion. Details of Precambrian structures are largely lacking. The rocks are in place and are not part of a great overthrust.
3. Evidence on the origin of the "pinite" of the Reading Hills, Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 37, p. 160-165, illus., **1963**. Petrographic and field studies in Berks and Lehigh Counties show the pinite to be a cataclastic rock resulting from intense shearing.

BUDDINGTON, ARTHUR FRANCIS.

1. Esper Signius Larsen, Jr., March 14, 1879-March 8, 1961: Natl. Acad. Sci. Biog. Mem., v. 37, p. 161-184, port., **1964**.

BULLARD, EDWARD CRISP.

1. Richard Montgomery Field [1885-1961]: Geol. Soc. London Proc. 1961-62, no. 1602, p. 154-155, **1962**.

BURFORD, ARTHUR EDGAR.

1. A comparison of Alpine and Appalachian geology: West Virginia Acad. Sci. Proc. 1963, v. 35, p. 151-159, illus., **1964**. Generalized comparisons are made; the two systems are similar to a limited extent. Many of the observations are from Pennsylvania. The Appalachian deformation appears to have "stopped short" of that attained by the Alps.

BURKE, J. J.

1. A new euomphalid gastropod from the Conemaugh Formation [Westmoreland County], Pennsylvanian: Carnegie Mus. Annals, v. 36, art. 10, p. 123-128, illus., **1962**. *Amphiscapha* (*Amphiscapha*) *elleri* from the Pennsylvanian Conemaugh Formation in Westmoreland County is described and illustrated.
2. A new *Endelocrinus* from the Brush Creek Limestone (Pennsylvanian) of [Allegheny County] Pennsylvania: Carnegie Mus. Annals, v. 39, art. 4, p. 75-83, illus., **1967**. *Endelocrinus murryvillensis* is described and illustrated.
3. Pachylocrinids from the Conemaugh Group, Pennsylvanian [Allegheny County]: Kirtlandia, no. 3, 18 p., **1968**. *Plummericrinus pittsburghensis* from the Ames Limestone and *P. nettingi* from the Cambridge Limestone, in Allegheny County, are described and illustrated.

BURTNER, ROGER LEE.

1. Sediment dispersal patterns within the Catskill facies of southeastern New York and northeastern Pennsylvania, in Symposium on Middle and Upper Devonian stratigraphy of Pennsylvania and adjacent states:

Pennsylvania Geol. Survey, 4th ser. Bull. G 39, p. 7-23, illus., 1963. Festoon cross-bedding is the major feature used; orientations of various other linear features were also utilized. Sediment transport was from east to west for the region as a whole.

2. Paleocurrent and petrographic analysis of the Catskill facies of southeastern New York and northeastern Pennsylvania: Ph D Thesis, Harvard Univ., 1965.
3. Petrography of the [Devonian] Catskill facies, southeastern New York and northeastern Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 82, p. 23-24, 1965.

BURTNETT, JOHN W., *see* Deasy, George F., 4.

BUSÉ, MARIA LUISA.

1. (and Watson, Edward Hahn). Alteration of ultrabasic rocks near Bryn Mawr, [Chester County] Pa.: Pennsylvania Acad. Sci. Proc. v. 34, p. 117-123, illus., 1960. Two belts of ultrabasic rocks intruded the Wissahickon Formation. The southern belt was dunitic, the northern one pyroxenite. Each was probably a continuous dike before deformation. The alteration process of each is described.

BUTLER, ARTHUR PIERCE, JR.

1. (and Finch, Warren Irvin, and Twenhofel, William Stephens). Epigenetic uranium in the United States, exclusive of Alaska and Hawaii: U. S. Geol. Survey Mineral Invs. Resource Map MR 21, scale, 1:3,168,000, separate text, 1962. The locations of uranium deposits in the state are shown. There are 17 known occurrences in 14 counties.

BUTLER, PHILLIP EDWARD.

1. Morphologic classification of sponge spicules, with descriptions of siliceous spicules from the Lower Ordovician Bellefonte dolomite in [Huntington County] central Pennsylvania: MS Thesis, Pennsylvania State Univ., 1964; Jour. Paleontology, v. 35, no. 1, p. 191-200, illus., 1961. *Hyalostelia clinopentactinoides* from near Union Furnace is described and illustrated. Some oxeoklosters are also included.

BYBEE, HALBERT HOMER.

1. Survey of preservation of samples and cores in United States and Canada: Am. Assoc. Petroleum Geologists Bull., v. 44, no. 7, p. 1205-1207, illus., 1960. Material from wells drilled in 1957 was used as a guide to adequacy of storage of cuttings and cores. In Pennsylvania, 151,370 feet were cut in oil and gas exploration, of which 50,000 feet were deposited in public repositories and 118,000 feet were deposited in company repositories.

CADWELL, D. H.

1. (and Moss, John Hall). Flood plain sediments and their movement during a high discharge, near Manheim [Lancaster County], Pennsyl-

vania: Pennsylvania Acad. Sci. Proc., v. 43, p. 185-186, illus., **1969**. Five distinctive types of deposits make up the flood plain of Rife Run. Painted pebbles were traced after a flood to a point-bar 150 feet downstream. Mantling this point-bar were similar gravels producing an unusual type of point-bar deposit unrelated to lateral cutting.

CAHN, JOSEPH HAROLD.

1. The origin of the [Devonian] Venango Second Sand Formation [northwestern Pennsylvania]: MS Thesis, Univ. Pittsburgh, **1940**.

CALLAGHAN, L.

1. On the topography and diseases of western Pennsylvania: Am. Jour. Med. Scis., v. 3, p. 34-41, **1828**. An early account of the topography of the state is given in connection with a review of the health problems of the area. At the time, a direct link between health and topography was suspected.

CALLAHAN, WILLIAM HENRY, *see also* Newhouse, Walter Harry, 1.

1. Paleophysiographic premises for prospecting for strata bound base metal mineral deposits in carbonate rocks, in Symposium on mining, geology and the base metals: Ankara, Turkey, CENTO, p. 191-248, illus., **1964**. The zinc-bearing deposits at Friedensville, Lehigh County, are cited as examples of deposits controlled by irregularities in deposition, reflecting an unconformity, which in turn reflects paleophysiography. The ore is in a breccia attributed to collapse by solution below the unconformity.
2. Geology of the Friedensville zinc mine, Lehigh County, Pennsylvania, in Ore deposits of the United States, 1933-1967, v. 1: New York, Am. Inst. Mining, Metallurgical and Petroleum Engineers, p. 95-107, illus., **1968**. The ore, sphalerite and pyrite, fills and replaces sedimentary type matrix of strata-bound solution-collapse breccia in the Beckmantown Formation. Submarine exhalations of the metal ions may have been the origin of the ore in Ordovician time as the ore-bearing beds are Taconically folded.

CALVERT, WARREN LYTLE.

1. Sub-Trenton rocks of Ohio in cross sections from West Virginia and Pennsylvania to Michigan: Ohio Div. Geol. Survey Rept. Inv. 49, 5 p., illus., **1963**. Information from one well in Crawford County is used. Generalized lithology (largely limestone) and electrical log information are used for the correlation. The Sauk and Tippecanoe Sequences are recognized.
2. Pre-Trenton sedimentation and dolomitization, Cincinnati Arch province—theoretical considerations: Am. Assoc. Petroleum Geologists Bull., v. 48, no. 2, p. 166-190, illus., **1964**. Cambrian and Lower Ordovician sedimentation is discussed, some of the data relating to the Commonwealth. Special depositional and erosional conditions are present. Original dolomite comes from diagenetic decomposition of authigenic biotite.

CAMERON, EUGENE NATHAN.

1. (and Weis, Paul Lester). Strategic graphite—a survey: U. S. Geol. Survey Bull. 1082 E, p. 201-321, illus., 1960. A general survey of the graphite industry, occurrence, and origin, includes a description of its occurrence in Chester County where it occurs in the Precambrian Pickering Gneiss.

CAMP, CHARLES LEWIS.

1. A study of the phytosaurs . . . : Univ. California Mem., v. 10, 192 p., illus., 1930. The phytosaurs of the southeastern Pennsylvania Triassic rocks are reviewed. All are included in the genus *Clepsysaurus* for which much detailed anatomical description is included.

CAMPBELL, ESMA Y., *see* Gottfried, David, 1.

CAMPBELL, LYLE D., *see also* Kauffman, Marvin Earl, 3.

1. (and Kauffman, Marvin Earl). *Olenellus* fauna of the Kinzers Formation, southeastern Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 43, p. 172-176, illus., 1969. At least three zones are present, from which the *Bonnina-Olenellus* fauna is described. Seven phyla and numerous genera and species are present. Structural deformation of the fossils invalidates 14 species of *Olenellus*. Fossil distortion and lithofacies studies are included.

CAMPOS, A. ROCHA, *see* Wanless, Harold Rollin, 2.

CANNON, HELEN LEIGHTON.

1. (and Shacklette, Hansford Threlkeld, and Bastron, Harry). Metal absorption by *Equisetum* (horsetail): U. S. Geol. Survey Bull. 1278-A, A1-A21, illus., 1968. Plants from tailings-pond areas of the Friedensville, Lehigh County, zinc mine are analyzed for their metal ion content. Here the maximum amounts of Zn, 9,000 ppm, were recorded.

CAREY, J. B., *see* Miller, Harold Ellis, Jr., 1.

CARLSON, CHARLES GORDON.

1. (and Clark, Frank Rinker, and Berry, Frederick Almet Fulghum). Arville Irving Levorsen (1894-1965): Am. Assoc. Petroleum Geologists Bull., v. 49, no. 9, p. 1534-1537, port., 1965; Tulsa Geol. Soc. Digest, v. 33, p. 276-277, port., 1965.

CARLSTON, CHARLES WILLIAM.

1. Character and history of the upper Ohio River valley: U. S. Geol. Survey Bull. 1141-I, p. 11-1110, illus., 1962. Bedrock studies show that the Ohio River was established by Illinoian time except for the headwaters (which then flowed northward as another stream). The Illinoian advance backed the north-flowing river up and diverted the northern flow to the south. This cut a deeper valley into the bedrock which was later filled with Wisconsin till.

2. Slope-discharge relations for eight rivers in the United States, in Geological Survey research **1968**: U. S. Geol. Survey Prof. Paper 600-D, p. D45-D47, illus., **1968**. The Delaware River shows a good correlation of slope with discharge whereas the Susquehanna and Ohio do not.

CARPENTER, FRANK MORTON.

1. Studies on North American Carboniferous insects—[Part.] 1, The Protodonata: *Psyche*, v. 67, no. 4, p. 98-110, illus., **1960**. *Palaeotherates pennsylvanicus* from black shale in the Pottsville conglomerate near Pittston, Luzerne County, is illustrated and redescribed. Only a part of the wing is present.
2. Studies on North American Carboniferous insects—[Part] 4, The genera *Metropator*, *Eubleptus*, *Hapaloptera* and *Hadentomum*: *Psyche*, v. 72, no. 2, p. 175-190, illus., **1967**. *Metropator pusillus* from Pennsylvanian rocks at Altamont and *Hapaloptera gracilis* from Pennsylvanian rocks at Sharp Mountain Gap, Schuylkill County are redescribed and illustrated.

CARPENTER, JOHN RICHARD.

1. (and Phyfer, Daniel W.). Proposed origin for the alpine type ultramafics of the Appalachians: *Geol. Soc. America Abstracts with Programs* 1969, pt. 7, p. 261-263, **1969**. The serpentinites of southeastern Pennsylvania have certain characteristics that can be attributed to emplacement as solid serpentinite.

CARR, MARTHA ENSIGN STRAIT.

1. (and Guild, Philip White, and Wright, Wilna B.). Iron in the United States, exclusive of Alaska and Hawaii: U. S. Geol. Survey Mineral Invs. Resource Map MR-51, scale, 1:3,168,000, separate text, **1967**. Iron occurs commonly throughout the state. Brown ore occurs throughout the western coal fields. The Clinton ores occur in the folded-rock areas, and numerous magnetite deposits are found, those in Lebanon, Berks, and Northampton Counties being the largest, throughout southeastern Pennsylvania.

CARR, MICHAEL H.

1. (and Turekian, Karl Karekin). The geochemistry of cobalt: *Geochim. et Cosmochim. Acta*, v. 23, nos. 1-2, p. 9-60, illus., **1961**. Many materials from many places are examined to see where cobalt resides. Pyrite from French Creek, in Chester County, contains 8.9 ppm Co, and diabase and other igneous rocks from several places in southeastern Pennsylvania also contain cobalt. Paleozoic sedimentary rocks are also analyzed.

CARSWELL, LOUIS DUNCAN, *see also* Platt, Lucian B., 1.

1. (and Bennett, Gordon Daniel). Geology and hydrology of the Neshannock Quadrangle, Mercer and Lawrence Counties, Pennsylvania: *Pennsylvania Geol. Survey*, 4th ser. Bull. W 15, 90 p., illus. incl. geol. map, **1963**. Mississippian-Pennsylvanian, and Pleistocene rocks are mapped

- and discussed, and the water-bearing properties of each unit evaluated. Ground water comes predominantly from sandstones in the bedrock and from unconsolidated Pleistocene and Recent sediments in the river valley. Analyses are included.
2. Field trip 2, Stratigraphy of the Pottsville and Allegheny Groups of Mercer and Lawrence Counties, Pa., in *Stratigraphy of the Pennsylvanian and Permian rocks of Washington, Mercer, and Lawrence Counties—Field Conf. Pennsylvania Geologists, 30th: Harrisburg, Pennsylvania Bur. Topog. and Geol. Survey, and U. S. Geol. Survey, p. 49-95, illus., 1965.* A brief description of the rocks in and near the type areas is followed by a field trip designed to study the lateral changes which take place within the stratigraphic units. The trip is largely in the Neshannock Quadrangle. The trip is 105 miles long, begins and ends in Pittsburgh, and makes 9 stops. cursory descriptions of the geology along the route are included.
 3. (and Hollowell, Jerrald R., and Platt, Lucian B.). *Geology and hydrology of the Martinsburg Formation in Dauphin County, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. W 24, 54 p., illus. incl. geol. map, 1968.* The various units in the formation are described, as are their water-bearing properties. The structure of the area is very complex. Ground water occurs in secondary openings along joints, faults, cleavages, and bedding planes. Analyses are included.

CARTER, M. DEVEREUX, *see* Wood, Gordon Harry, Jr., 15.

CARTER, WILLIAM DOUGLAS.

1. The W. L. Newman phosphate mine, Juniata County, Pennsylvania: *Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 64, 16 p., illus., 1969.* Phosphate occurs in the Devonian Onondaga and Ridgely Formations in the form of carbonate fluorapatite and oölitic calcareous nodules. Crandallite (aluminum phosphate) is also present. Reserves cannot be calculated because of lack of data.

CARUCCIO, FRANK THOMAS.

1. The hydro-geology of the sewage disposal experiment area, northwest of State College, [Centre County] Pennsylvania: MS Thesis, Pennsylvania State Univ., 1963.
2. An evaluation of factors influencing acid mine drainage production from various strata of the Allegheny Group and the ground water interactions in selected areas of western Pennsylvania: PhD Thesis, Pennsylvania State Univ., 1967; [abs.], *Dissert. Abs. B, v. 29, no. 1, p. B245-B246, 1968.*

CATE, ADDISON SMITH, *see also* Lytle, William Stuckley, 5, 6, 7, 8, 11.

1. Stratigraphic studies of the Silurian rocks of Pennsylvania—Part 1, Stratigraphic cross sections of Lower Devonian and Silurian rocks in western

Pennsylvania and adjacent areas: Pennsylvania Geol. Survey, 4th ser. Spec. Bull. 10, [9] p., illus., **1961**. Numerous sections are included, and correlations with New York and Ohio are made. The gentle flexures in the rocks are evident.

2. [Map of] Subsurface structure of the plateau region, north-central and western Pennsylvania, on top of Oriskany Formation: Pennsylvania Geol. Survey, 4th ser. [Map 9], scale about 1 in. to 4 mi., revised, **1962**.
3. Lithostratigraphy of some Middle and Upper Devonian rocks in the subsurface of southwestern Pennsylvania, in Symposium on Middle and Upper Devonian stratigraphy of Pennsylvania and adjacent states: Pennsylvania Geol. Survey, 4th ser. Bull. G 39, p. 229-240, illus., **1963**. Surface rock units are recognized in the subsurface and there is confirming evidence of a major marine regression, the climax of which was the building of the Catskill Delta.
4. Purcell [gas] field [Bedford County], in Oil and gas developments in Pennsylvania in 1962: Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 165, p. 22-26, illus., **1963**. Gas comes from the Devonian Oriskany Sandstone in a faulted anticline in the Broad Top Synclinorium.
5. Stratigraphy of Cayugan Series in northwestern Pennsylvania, in Symposium on salt: Cleveland, Northern Ohio Geol. Soc., p. 19-26, illus., **1963**. Dolomite, shale, and salt occur in repetitive sequences. Their origin and correlation with salt-bearing rocks of similar age in nearby states is discussed. The origin of the varying sedimentation conditions is related to changing boundary conditions of the basin.
6. Crichton [gas] pool [Indiana County] in Oil and gas developments in Pennsylvania in 1963: Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 166, p. 24-26, illus., **1964**. Gas occurs in the Onondaga Chert and Oriskany Sandstone on the west flank of a faulted dome and an associated anticlinal nose. A small-scale structure contour map is included.
7. Kohl [gas] pool [Westmoreland County], in Oil and gas developments in Pennsylvania in 1963: Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 166, p. 26-28, illus., **1964**. Gas occurs in the Oriskany Sandstone on a faulted dome along the Fayette Anticline. Eight wells are currently producing.
8. Stratigraphic studies of the Silurian rocks of Pennsylvania—Part 2, Subsurface maps of the Silurian rocks of western Pennsylvania and adjacent areas: Pennsylvania Geol. Survey, 4th ser. Spec. Bull. 11, 8 p., illus., **1965**. The subsurface Silurian rocks are related to the outcropping Silurian rocks. A major basin axis lies roughly parallel to the present structural trend of the Appalachian Mountains. Isopach maps of the Medina, Clinton, Guelph, Lockport Group, and the total Salina are given as are isopach maps of the Devonian Bass Island Group and/or Keyser Formation. Structure contour maps on the top of the Ordovician Queenston Formation, the base of the Irondequoit Formation, and the top of the Salina Formation are also included.

CATHCART, STANLEY HOLMAN, 1883-1953, *see* Fettke, Charles Reinhard, 18.

CAVOROC, VICTOR VIOSCA, JR., *see also* Ferm, John Charles, 8.

1. Delineation of some outer deltaic plain subenvironments based on sedimentary properties in vertical section [abs.]: *Am. Assoc. Petroleum Geologists Bull.*, v. 53, no. 3, p. 710-711, **1969**.
2. Geology of some Carboniferous lower deltaic plain sediments of western Pennsylvania: PhD Thesis, Louisiana State Univ., **1969**.

CHAFETZ, HENRY S.

1. Carbonates of the Lower and Middle Ordovician in central Pennsylvania: *Pennsylvania Geol. Survey, 4th ser. Bull. G 58*, 39 p., illus., **1967**. The petrology and stratigraphic relations of the Milroy Member of the Loysburg Formation, above the Lower-Middle Ordovician contact, are investigated. Almost all are micritic, from shallow marine to supratidal environments, and are gradational to adjacent units.

CHANG, C.

1. (and Waenke, Heinrich). Beryllium-10 in iron meteorites, their cosmic ray exposure and terrestrial ages, *in* *Meteorite research*: New York, Springer-Verlag, p. 397-406, illus., **1969**. The Mt. Joy meteorite, from Adams County, has a terrestrial age of $7.5 (+3.5, -2.0) \times 10^5$ years.

CHAO, EDWARD CHING-TE.

1. (and Fleiseher, Michael), Abundance of zirconium in igneous rocks: *Internatl. Geol. Cong. 21st, Proc. Sec. 1*, p. 106-131, illus., **1960**. Analyses of basalt-granophyres from Dillsburg, York County, are included. The Zr content rises from 60 ppm in the chilled diabase to 300 ppm in the granophyre.

CHESTER COUNTY PLANNING COMMISSION.

1. Chester County—Natural environment and planning, landforms, geology, soils, woodlands, climate: West Chester, Pa., Chester County Planning Commission, 70 p., illus., **1963**. A generalized description of the topography and geology of the county is included.

CHIDESTER, ALFRED HERMAN.

1. (and Shride, Andrew Fletcher). Asbestos in the United States, exclusive of Alaska and Hawaii: *U. S. Geol. Survey Mineral Invs. Resource Map MR 17*, scale, 1:3,168,000, separate text, **1962**. Asbestos is known only from the Media area in Chester County.
2. (and Worthington, Helen Weissenborn). Talc and soapstone in the United States, exclusive of Alaska and Hawaii: *U. S. Geol. Survey Mineral Invs. Resource Map MR 31*, scale 1:3,168,000, separate text, **1962**. Talc occurs in Lehigh County, and soapstone is reported from Montgomery and Chester Counties.
3. (and Engel, Albert Edward John and Wright, Lauren Albert). Talc resources of the United States: *U. S. Geol. Survey Bull. 1167*, 59 p., illus. incl. atlas, **1964**. Talc from ultramafic rocks in southeastern Pennsylvania is known, but little production has resulted except from some deposits in the metamorphic rocks near Easton, Lehigh County.

CLACK, WILLIAM C. *see* Gwinn, Vinton Edward, 4.

CLARK, DAVID, *see* Bailey, Charles, 1.

CLARK, FRANK RINKER, *see* Carlson, Charles Gordon, 1.

CLARK, GEORGE MICHAEL.

1. Sorted patterned ground—new Appalachian localities south of the glacial border: *Science*, v. 161, no. 3839, p. 355-356, illus., **1968**. Sorted stripes, nets, and polygons from Broad Top, Huntingdon County; Negro Mountain, and Mt. Davis, Somerset County; and Riansares Mtn., Glinton County, are described and illustrated. The large types are inactive.
2. Preliminary distribution, characteristics, and origin of some Appalachian sorted patterned ground localities south of the glacial border [abs.]: *Geol. Soc. America Abstracts with Programs* 1969, pt. 7, p. 34, **1969**.

CLARK, JOHN HARRIS.

1. The geology of the Ordovician carbonate formations in the State College [Centre County] Pennsylvania area, and their relationships to the general occurrence and movement of ground water: MS Thesis, Pennsylvania State Univ., **1965**.

CLARK, LAWRENCE.

1. (and Thompson, Glenn). Big Ridge Cave, Mifflin County . . . : *Nittany Grotto News*, v. 12, no. 2, p. 44-47, illus., **1963**; *Speleo Digest* 1963, p. I24-I26, illus., **1965**.

CLAVAN, WALTER S., *see* Norton, Dorita, Anne, 1.

CLENDENING, JOHN A., *see also* Jones, Michael Lindsey, 1.

1. Small spores applicable to stratigraphic correlation in the Dunkard Basin of West Virginia and [southwestern] Pennsylvania: *West Virginia Acad. Sci. Proc.* 1962, v. 34, p. 133-142, illus., **1962**. Numerous species of spores from the Dunkard coals of southwestern Pennsylvania are illustrated. *Laevigatosporites* is the most common; typical Permian floras were not recognized.
2. (and Gillespie, William Harry). Characteristic small spores of the Pittsburgh Coal in West Virginia and [Allegheny County] Pennsylvania: *West Virginia Acad. Sci. Proc.* 1963, v. 35, p. 141-150, illus., **1964**. Sixteen genera and thirty-five species of spores are recognized and illustrated. The flora is uniform throughout the area studied. *Thymnospora theissenii* is present throughout.
3. *Schopfipollenites* in the Washington Formation, Dunkard Group, Upper Pennsylvanian of West Virginia and [Greene County] Pennsylvania: *West Virginia Acad. Sci. Proc.* 1966, v. 38, p. 169-176, illus., **1967**. Four species from the Jollytown Coal are described and illustrated. *Schopfipollenites varius* is new; the other three remain unnamed.
4. Three new species of *Fabasporites* Sullivan 1964 from the Appalachian Basin: *West Virginia Acad. Sci. Proc.* 1967, v. 39, p. 315-319, illus., **1967**. *Fabasporites molestus*, *F. exilis*, and *F. parvus* from the Permian

Little Washington Coal in Washington County, are described and illustrated.

5. *Gillespiesporites* gen. nov., and *Laevigatosporites plicatus* sp. nov., from the Dunkard strata of the Appalachian Basin: West Virginia Acad. Sci. Proc. 1968, v. 40, p. 262-269, illus., 1968. *Gillespiesporites venustus* from the Jollytown Coal in Greene County is described and illustrated.

CLINE, G. D.

1. Geologic factors influencing well yields in a folded sandstone-siltstone-shale terrane within the East Mahantango Creek watershed, [Snyder County] Pennsylvania: MS Thesis, Pennsylvania State Univ., 1968.

CLINE, WILLIAM, *see* Miller, Charles, 2, 3, 4.

CLOOS, ERNST, *see also* Yochelson, Ellis Leon, 3.

1. (and Wise, Donald Underkoffler). The Martic problem and the New Providence railroad cut [Lancaster County], in Some tectonic and structural problems of the Appalachian Piedmont along the Susquehanna River—Field Conf. Pennsylvania Geologists, 25th: Lancaster, Franklin and Marshall College, p. 39-48, illus., 1960. A generalized discussion of the Martic Line problem and its various interpretations is included in a description of a railroad cut where the contact is well exposed. Complex folded and metamorphosed imbricate faults are probable.
2. Wedging, bedding plane slips, and gravity tectonics in the Appalachians, in Tectonics of the southern Appalachians: Virginia Polytech. Inst., Geol. Dept. Mem. 1, p. 63-70, illus., 1964. In Lancaster County the stratigraphic section has been repeated several times by gravity sliding and bedding slips before folding and metamorphism took place.
3. Appalachenprofil 1964 [with English, French, and Russian abs.]: Geol. Rundschau, v. 54, no. 2, p. 812-834, illus., 1965. This is a survey of the information accrued about the Appalachian Mountains (including Pennsylvania) in the previous ten years. At least two intervals of folding are noted, an Ordovician, and the Appalachian orogeny. The former included the basement, the latter not so.
4. Dating Blue Ridge deformation plan with slickensides and lineations [abs.]: Geol. Soc. America Spec. Paper 101, p. 253, 1968.
5. (and others). The geology of mineral deposits in south-central Pennsylvania—Field Conf. Pennsylvania Geologists, 33rd: Harrisburg, Pennsylvania Bur. Topog. and Geol. Survey, 80 p., illus., 1968. This guidebook for a two day field trip, beginning and ending in Harrisburg, contains detailed discussions of mineral deposits in the region. Each deposit is discussed in separate papers which are cited individually. Stops are made at the GAF greenstone quarry, Hanover quarry, Thomasville stone quarry, Bender's quarry, Mt. Holly white clay deposits, Millard quarry, and Eschelmann's quarry. Very little geological data is given along the route, however.
6. Thomasville Stone and Lime Company, Thomasville [York County], Pennsylvania, in The geology of mineral deposits in south-central Pennsylvania—Field Conf. Pennsylvania Geologists, 33rd: Harrisburg, Pennsylvania

Bur. Topog. and Geol. Survey, p. 16-24, illus., **1968**. Detailed lithological descriptions of the Kinzers and Vintage Formations, of Cambrian age, are given. Bedding is plainly seen in all but breccia beds, and faults are very prominent; cross faults are present but hard to detect, and strike faults are open zones, often muddy and cavernous. Both chemical and crushed stone are produced. Nine specific locations in the large quarry complex are described.

CLOUD, WILLIAM K., *see* Lander, James French, 1; Von Hake, Carl A., 1.

COATES, DONALD ROBERT, *see also* Harrison, John E., 1.

1. Base flow characteristics of streams in the glaciated Appalachian Plateau [northern Pennsylvania] [abs.]: Am. Geophys. Union Trans., v. 47, no. 1, p. 87, **1966**.
2. Glaciated Appalachian Plateau [northern Pennsylvania]—till shadows on hills: Science, v. 152, no. 3729, p. 1617-1619, illus., **1966**. North slopes are twice as steep as south slopes on the hills of central New York [and northern Pennsylvania.]. This asymmetry is caused by unequal till thickness. Previous workers interpreted the hills as being composed of bed-rock sculptured by glacial erosion with till 0.9 to 3 meters thick.

COE, GLEN DALE, *see* Gray, Ralph Joseph, 1.

COHEE, GEORGE VINCENT.

1. Hugh Dinsmore Miser (1884-1969): Am. Assoc. Petroleum Geologists Bull., v. 53, no. 12, p. 2560-2562, port., **1969**.

COLBERT, EDWIN HARRIS.

1. (and Gregory, Joseph Tracy). Correlation of continental Triassic sediments by vertebrate fossils, in Correlation of Triassic formations of North America exclusive of Canada: Geol. Soc. America Bull., v. 68, no. 11, p. 1456-1467, **1957**. The vertebrate fauna of the Newark Group (including those exposures in southeastern Pennsylvania) is discussed and compared, for correlation purposes, with Upper Triassic terrestrial vertebrate faunas from elsewhere in the United States.
2. Ancient reptile of Blue Ball [Lancaster County]: Frontiers, v. 31, no. 2, p. 42-44, illus., **1960**. This is a popular account of the occurrence and collecting of some jaws of the phytosaur *Rutiodon* in a quarry.
3. A new Triassic procolophonid from [Lancaster County] Pennsylvania: Am. Mus. Novitates, no. 2022, 19 p., illus., **1960**. *Sphodrosaurus pennsylvanicus*, a reptile, from the Brunswick Formation in Lancaster County, is described and illustrated.

COLE, WILLIAM STORRS.

1. Memorial to Oskar Diedrich Von Engeln (1880-1965): Geol. Soc. America Bul., v. 76, no. 10, p. P153-P156, port., **1965**.

COLEMAN, K. F.

1. Interpretation of magnetic anomalies in the Dillsburg area, York County, Pennsylvania: MS Thesis, Pennsylvania State Univ., **1966**.

COLEMAN, ROBERT GRIFFIN.

1. Memorial of Adolph Knopf (Dec. 2, 1882-Nov. 23, 1966): *Am. Mineralogist*, v. 53, nos. 3-4, p. 567-576, port., **1968**.

COLLINS ROBERT S., *see* Miller, David William, 1.

COLLINS, WILLIAM DENNIS.

1. Chemical character of ground water in Pennsylvania: *Pennsylvania Water Works Operators Assoc. Jour.*, v. 6, p. 81-84, **1934**; discussions, p. 84-88. A general discussion of the effects and origin of chemicals in water includes numerous examples from Pennsylvania. It is of much more than academic interest to know the composition of ground water.

COLLINSON, D. W.

1. (and Runcorn, Samuel Keith). Polar wandering and continental drift—evidence from paleomagnetic observations in the United States: *Geol. Soc. America Bull.*, v. 71, no. 7, p. 915-958, illus., **1960**. Magnetic readings from the Ordovician Juniata redbeds in Bedford County are used, along with others from elsewhere, to substantiate earlier polar-wandering curves.

COLTON, GEORGE WILLIS, *see also* deWitt, Wallace, Jr., 1.

1. Geologic summary of the Appalachian Basin, with reference to the sub-surface disposal of radioactive waste solutions: *U. S. Geol. Survey Trace Elems. Invs.* 791, 118 p., illus. incl. geol. maps, **1961**. The geological history of the basin, which includes all of Pennsylvania underlain by sedimentary rocks, is outlined. Generalized lithologic sequences are identified, and their potential as waste reservoirs is described, as are certain specific regions. The Late Ordovician clastic sequence probably has the greatest potential. Mississippian and Pennsylvanian clastic rocks have the least potential. Numerous maps show the distribution and nature of each of the lithologic sequences.
2. [Map of] Bedrock geology of the Cedar Run Quadrangle, Tioga and Lycoming Counties, Pennsylvania: *Pennsylvania Geol. Survey*, 4th ser. Prog. Rept. 164, scale, 1:24,000, text, **1963**. Devonian-Pennsylvanian rocks are mapped and cursorily described, and an extremely general discussion of the geology of the area is given. Coal, clay, ochre, flagstone, and gas are present.
3. Devonian and Mississippian correlations in [Tioga and Lycoming Counties] part of north-central Pennsylvania—A report of progress, in *Symposium on Middle and Upper Devonian stratigraphy of Pennsylvania and adjacent states*: *Pennsylvania Geol. Survey*, 4th ser. Bull. G. 39, p. 115-125, illus., **1963**. Details of the rocks and tentative correlations are made. A conglomerate unit is very persistent and marks the Devonian-Mississippian boundary.

4. (and Luft, Stanley Jeremie). [Map of] Bedrock geology of the Slate Run Quadrangle, Clinton, Lycoming, and Potter Counties, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 167, scale, 1:24,000, text, **1965** [1966]. Devonian-Pennsylvanian rocks are mapped and cursorily described. Flagstone is the chief economic deposit of the area. The natural gas potential of the Oriskany Sandstone is discussed.
5. Surface structure map of parts of Lycoming, Clinton, Tioga, and Potter Counties, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Map 14, scale, 1:48,000, text, **1967**.
6. [Map of] Bedrock geology of the Waterville Quadrangle, Lycoming County, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 174, scale, 1:24,000, text, **1968**. Devonian-Mississippian rocks are mapped and cursorily described. Gentle folds comprise the structure. Flagstone is the only mineral resource present.

COLTON, HAROLD SELLERS.

1. Biography of Henry Hollister Robinson, 1873-1925: *Plateau*, v. 41, no. 2, p. 72-86, port., illus., **1968**.

COMPSTON, W. A., *see* Bofinger, V. M., 1.

CONLIN, RICHARD RENAULT, *see also* Hoskins, Donald Martin, 6; Miller, John Tinney, 2.

1. (and Hoskins, Donald Martin). Geology and mineral resources of the Mifflintown Quadrangle, [Juniata, Perry, Mifflin, and Snyder Counties] Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Atlas A 126, [Bull. A 126], 46 p., illus. incl. geol. map, **1962**. A complete geological description of the area is given. Ordovician-Devonian, and Holocene rocks are mapped. Folds are the dominant structures. Stone is the only mineral resource present.

CONNELLY, THOMAS L.

1. Discovering the Appalachians: Harrisburg, Stackpole Books, 223 p., illus., **1968**. A popular account of the origin, sculpturing, use and mineral resources of the entire Appalachian chain includes cursory descriptions of that part in Pennsylvania.

CONRAD, TIMOTHY ABBOTT, 1803-1877.

1. Descriptions of new species of fossil and recent shells and corals: *Acad. Nat. Sci. Philadelphia Proc.*, v. 3, p. 19-27, illus., **1848**. *Monotis poulsoni*, *M. elevata*, from Devonian Chemung (?) rocks in Lycoming County, *Avicula ferrugina* from [Clinton Formation] Silurian rocks in Lycoming County, and *Strophomoena massula* from Carboniferous rocks in Lycoming County are described. All but the latter are illustrated.

COOPER, GUSTAV ARTHUR.

1. Age and correlation of the Tully and Cedar Valley Formations in the United States, in *Internatl. symposium on the Devonian System*, v. 2: Calgary, Alberta, Alberta Soc. Petroleum Geologists, p. 701-709, illus., **1967**. A case is made that the Tully Limestone is Middle Devonian in age, based on its paleontological content and stratigraphic position.

COPELAND, W. A., *see* Fettke, Charles Reinhard, 8.

CORMANY, ROBERT.

1. (and Schmitt, Larry). Crow-bait Cave (Cumberland County, Pennsylvania): *Worlds Below*, v. 1, no. 4, p. 12, illus., **1961**; *Speleo Digest* 1961, p. I17-I18, illus., **1963**.

CORNELL, LEE H., *see* Beebe, Byron Warren, 1.

CORNWALL, HENRY ROWLAND.

1. Nickel deposits of North America: U. S. Geol. Survey Bull. 1223, 62 p., illus., **1966**. A general summary of the origin and occurrence of nickel ores is followed by very cursory descriptions of many deposits in North America including the Gap Mine in Lancaster County.

CRAMER, FRITZ H.

1. Possible climate dependability of Silurian acritarchs [abs.]: *Geol. Soc. America Abstracts with Programs* 1969, pt. 2, p. 7, **1969**.
2. Possible implications for Silurian paleogeography from phytoplankton assemblages of the Rose Hill and Tuscarora Formations of [Perry County] Pennsylvania: *Jour. Paleontology*, v. 43, no. 2, p. 485-491, illus., **1969**. Three new species of acritarchs and chitinozoans are described and illustrated as part of a large flora. The forms are used to demonstrate the existence of two great phytoplankton provinces.

CRAMER, HOWARD ROSS.

1. Additions to the Hamilton biota at Rockville, Dauphin County, Pennsylvania: *Pennsylvania Acad. Sci. Proc.*, v. 32, p. 184-187, illus., **1958**; correction, with title, *Suppression of the name *Tasmanites rockvillensis* . . .*: *Jour. Paleontology*, v. 35, no. 5, p. 1087, **1961**. A blastoid, a nautiloid, and spores (?) from the Devonian Montebello Sandstone are described and illustrated. The spores are more likely chamosite oolites.
2. Bibliography and index of Triassic paleontology in Pennsylvania: *Pennsylvania Acad. Sci. Proc.*, v. 34, p. 96-100, **1960**. Sixty-four references to Triassic fossil descriptions and an index to genera and species are included.
3. Annotated bibliography of Pennsylvania geology to 1949: *Pennsylvania Geol. Survey*, 4th ser. Bull G 34, 453 p., illus., **1961**.
4. Annotated bibliography of Pennsylvania geology—supplement to 1959: *Pennsylvania Geol. Survey*, 4th ser. Bull. G 42, 237 p., **1965**.

CRANE, HORACE RICHARD.

1. (and Griffin, James Bennett). University of Michigan radiocarbon dates, [Part] 6: *Radiocarbon*, v. 3, p. 105-125, **1961**. Small mammal bones, mostly hare (*Lepus americanus*) from Lloyd's Rock Hole Cave in Bedford County, are $9,540 \pm 500$ years old.
2. (and Griffin, James Bennett). University of Michigan radiocarbon dates XII: *Radiocarbon*, v. 10, no. 1, p. 61-114, **1968**. Charcoal from Hosterman's Pit Cave in Centre County, associated with fossil vertebrate bones, is $9,240 \pm 1,000$ years old. This is the earliest C-14 date yet determined on Recent fauna in the northeastern United States.

CRARY, ALBERT PADDOCK, *see* Ewing, William Maurice, 1.

CREER, KENNETH M., *see* Roy, Jean L., 2.

CRITTENDEN, MAX DERMONT, JR.

1. (and Pavlides, Louis). Manganese in the United States, exclusive of Alaska and Hawaii: U. S. Geol. Survey Mineral Invs. Resource Map MR 23, scale, 1:3,168,000, separate text, **1962**. Several small deposits are known and shown.

CROOK, KEITH A. W.

1. Appendix—Analyses of five analcimes from North America: Geol. Soc. America Bull., v. 78, no. 2, p. 280-282, illus., **1967**. Analysis of a vein analcime from the analcimolite-bearing Triassic Lockatong Formation in the Rushland Quarry [Bucks County] is given. This fits well into the scheme of Coombs and Whitten in which the chemical variability of analcimes varies with different provenances.

CROOKS, JAMES WALKER, *see* Stuart, Wilbur Tennant, 3.

CROSS, AUREAL THEOPHILIUS.

1. (and Schemel, Mart Phillip). Some geological interpretations and the significance of certain plant microfossils in Pennsylvanian strata of the Ohio River Valley in northern West Virginia [abs.], in Third conference on the origin and constitution of coal: Halifax, Nova Scotia Dept. Mines and Nova Scotia Research Foundation, p. 295-296, [**1961**].
2. A coal-ball flora from [Lawrence County] Pennsylvania [abs.]: Am. Jour. Botany, v. 54, no. 5, pt. 2, p. 652, **1967**.

CROWE, CHRISTOPHER.

1. (and Chaffar-Adly, Rhamat, and Shank, John Charles). Geophysical surveys in the Triassic basin, north Chester County, Pennsylvania—A progress report: Pennsylvania Acad. Sci. Proc., v. 36, p. 225-231, illus., **1962**. Gravity and magnetic surveys near Warwick, over a diabase dike, are described. The effect of the dike, when represented by a dipping slab model, is removed from the gravity, but not the magnetic data. It is possible, however, that the cause of the gravity and magnetic anomalies is from the dipping diabase.

CRUFT, EDGAR FRANK, *see* Keith, Mackenzie Lawrence, 2.

CULBERTSON, JAMES K.

1. Progress report of hydrology and sedimentation in Bixler Run [Perry County], Corey Creek, and Elk Run [Tioga County], watersheds, Pennsylvania: U. S. Geol. Survey Repts. Open File, 44 p., illus., [**1957**]. The relationships between sediment load, rainfall, runoff, topography,

and channel changes are described for three different watersheds where soil conservation practices are applied. All three channels were filled with sediments.

CULBERTSON, WILLIAM CRAVEN, *see* Kehn, Thomas Mathew, 2.

CULLINAN, MICHAEL.

1. State's Cave . . . Huntingdon County: *Netherworld News*, v. 9, no. 12, p. 217-218, illus., **1961**; *Speleo Digest* 1961, p. I56, I59, illus., **1963**.

CUNNINGHAM, ROBERT LESTER, *see* Petersen, Gary Walter, 1, 2.

CURL, RANE LOCKE.

1. Caves as a measure of karst: *Jour. Geology*, v. 74, no. 5, pt. 2, p. 798-830, illus., **1966**. A model is developed to obtain a constant which is characteristic of a karst, to predict the number and length distributions of entranceless caves and the length distribution of all caves in each region. Some examples are taken from Pennsylvania data.

CUSHMAN, ROBERT VITTUM, *see* Olmsted, Franklin Howard, 1.

DACHILLE, FRANK, *see* Hryckowian, Eugene, 1, 2, 3.

DA COSTA, JOSE ALVES.

1. Water-level fluctuations [northeastern Pennsylvania] caused by Montana earthquake: *Am. Geophys. Union Trans.*, v. 40, no. 4, p. 346, illus., **1959**. The water level in mine-pools in the anthracite region fluctuated with a double amplitude of from 0.05 to 0.17 feet from the effects of the Hebgen Lake earthquake.

D'AGOSTINO, JOHN P., *see* Epstein, Jack Burton, 3.

DAHLBERG, ERIC CHARLES, *see also* Keith, Mackenzie Lawrence, 2.

1. Statistical analysis of petrographic variability in a graded bed: MS Thesis, Pennsylvania State Univ., **1965**.
2. A multivariate study of some aspects of trace metals in stream sediments as a guide to locating mineral deposits: PhD Thesis, Pennsylvania State Univ., **1967**.
3. Application of a selective simulation and sampling technique to the interpretation of stream sediment copper anomalies near South Mountain [southeastern] Pennsylvania: *Econ. Geology*, v. 63, no. 4, p. 409-417, illus., **1968**. Copper was analyzed spectroscopically from sediment samples from streams. A model, which includes cultural features, forests, metabasaltic rocks, and existing prospects and workings, is developed so that anomalies can be detected in the search for copper.
4. (and Keith, MacKenzie Lawrence). Distributions of trace metals in modern stream sediments from three geologically different terranes [abs.]: *Geol. Soc. America Spec. Paper* 101, p. 48, **1968**.
5. Use of model for relating geochemical prospecting data to geological attributes of a region, South Mountain [southeastern] Pennsylvania, *in*

International geochemical exploration symposium: Colorado School Mines Quart., v. 64, no. 1, p. 195-216, illus., **1969**. A technique of regression analysis, used in analyzing stream sediments to predict areas of potential detailed exploration, is outlined. The occurrence of native copper near South Mountain is used. Various anomalies are investigated and removed and only those caused by copper variation remained.

DALE, WILLIAM J., *see* Denny, Charles Storow, 3.

DAMON, PAUL EDWARD, *see* Fanale, Fraser Partington, 2.

DANE, CARLE HAMILTON.

1. John Bernard Recside, Jr., 1889-1958: Natl. Acad. Sci. Biog. Mem., v. 35, p. 272-291, port., **1961**.

DANILCHIK, WALTER, *see also* Arndt, Harold Harry, 4, 5.

1. (and Arndt, Harold Harry, and Wood, Gordon Harry, Jr.). Geology of anthracite in the eastern part of the Shamokin Quadrangle, Northumberland County, Pennsylvania: U. S. Geol. Survey Coal Invs. Map C 46, 2 sheets, scale, 1:12,000, text, **1962**. A very general description of the Mississippian and Pennsylvanian rocks includes extensive descriptions of coal units, correlations, and structures. A coal outcrop map and a structure contour map on the Birch Mountain Coal are also included.

DANSEREAU, PIERRE.

1. Alpine vegetation in eastern North America: Cranbrook Inst. Sci. News Letter, v. 37, no. 8, p. 94-102, illus., **1968** [not seen].

DAPPLES, EDWARD CHARLES, *see* Sloss, Laurence Louis, 1.

DARRAH, ELSIE L., *see also* Morey, Elsie Darrah.

1. Cutinized seed megaspores in Pennsylvania coals [abs.]: Pennsylvania Acad. Sci. Proc., v. 40, no. 1, p. 12, **1966**.

DARRAH, WILLIAM CULP.

1. *Rhodea* in the Mississippian (Pocono) floras of the Appalachian region: Pennsylvania Acad. Sci. Proc., v. 41, p. 71-73, illus., **1967**. *Rhodea koppei*, new species, from near Elizabethville, [Dauphin County] is described and illustrated.
2. The pteridosperm genus *Lescuropteris*—characteristics, distribution, [western Pennsylvania] and significance [abs.]: Am. Jour. Botany, v. 55, no. 6, p. 725, **1968**.
3. The age of the highest coals of the Southern Anthracite field [Schuylkill County] [abs.]: Pennsylvania Acad. Sci. Proc., v. 43, p. 14, **1969**.
4. A critical review of the Upper Pennsylvanian floras of eastern United States, with notes on the Mazon Creek flora of Illinois: [Gettysburg, Pennsylvania], privately printed, 220 p., illus., **1969**. Many genera and species from throughout Pennsylvania are described and illustrated in this review of the flora. Many are new and many are revisions.

DAVIDSON, ANTHONY.

1. (and Wyllie, Peter John). Zoned magnetite and platy magnetite in Cornwall type ore deposits [southeastern Pennsylvania]: *Econ. Geology*, v. 60, no. 4, p. 766-771, illus., **1965**. Optical, electron microprobe, and x-ray analyses of 18 samples for Ti, Si, V, Mn, Co, and Ni show them to be not preferentially distributed but that Al and Mg are distributed in zones. Platy magnetite contains slightly less Fe and slightly more impurities in the outer rims than in the cores.
2. (and Wyllie, Peter John). Opaque oxide minerals of some diabase-granophyre associations in [southeastern] Pennsylvania: *Econ. Geology*, v. 63, no. 8, p. 950-960, illus., **1968**. Variations in the occurrences of ilmenite, magnetite, and ulvospinel in various igneous rocks associated with the Triassic diabase intrusions are noted. During differentiation, iron was dissolved from titaniferous magnetite intergrowths, leaving skeletal ilmenite. Ore iron was redeposited as Ti-poor magnetite within the source rock.

DAVIES, WILLIAM EDWARD.

1. Memorial to Ralph W[alter] Stone, 1876-1964: *Natl. Speleol. Soc. Bull.*, v. 27, no. 1, p. 33-34, **1965**.

DAVIS, B. S., *see* Ash, Simon Harry, 1.

DAVIS, GORDON LESLIE, *see* Bass, Manuel Nathan, 1; Tilton, George Robert, 1.

DAVIS, MARGARET BRYAN.

1. Phytogeography and palynology of northeastern United States, in *The Quarternary of the United States*: Princeton, New Jersey, Princeton Univ. Press, p. 377-401, illus., **1965**. Glaciated northern Pennsylvania is included in a general summary of the changes in vegetation which have occurred since the ice abandoned the area. The data come from pollen spectra in bogs and radioactive dating of the organic material.

DAVIS, NEVIN W., *see also* Russell, William E., 7.

1. Jacksonville Cave, Centre County: *Nittany Grotto News*, v. 10, no. 11, p. 203, illus., **1962**.
2. The discovery of Hosterman's Pit Cave [Centre County]: *Nittany Grotto News*, v. 12, no. 2, p. 33-41, illus., **1963**.
3. (and Frable, Judith). New cave report [Fishing Creek Cave, Centre County]: *Nittany Grotto News*, v. 11, no. 10, p. 197, illus., **1963**.
4. (and Frable, Judith). New cave report [Lamar Cave, Centre County]: *Nittany Grotto News*, v. 11, no. 10, p. 196, illus., **1963**.
5. New section opened at Hosterman's [Pit Cave, Centre County]: *Nittany Grotto News*, v. 11, no. 4, p. 66-68, illus., **1963**; *Speleo Digest* 1963, p. 119-121, illus., **1965**.
6. Seventeen new central Pennsylvania caves: *Nittany Grotto News*, v. 13, no. 5, p. 84-94, illus., **1965**.
7. [Thomas Quarry Caves] Blair County: *Nittany Grotto News*, v. 15, no. 2, p. 23-25, illus., **1966**.

8. Penn Aqua [Cave] . . . Mifflin County: Nittany Grotto News, v. 16, no. 1, p. 11-12, illus., **1967**.
9. Big Ridge Cave [Mifflin County] extended: Nittany Grotto News, v. 16, no. 5, 86-87, illus., **1968**.

DAVIS, ROBERT ELLIS, *see also* Drake, Avery Ala, Jr., 1, 2, 6.

1. (and Drake, Avery Ala, Jr., and Epstein, Jack Burton). Geologic map [and sections] of the Bangor Quadrangle, [Northampton County] Pennsylvania-New Jersey: U. S. Geol. Survey Geol. Quad. Maps of the U. S., Map GQ 665, scale, 1:24,000, **1967**. Only Ordovician rocks and Quaternary glacial and alluvial deposits are present in Northampton County.

DEASY, GEORGE F.

1. (and Griess, Phyllis Rice). Regional differences in some chemical and physical properties of [northeastern] Pennsylvania anthracite: Pennsylvania Acad. Sci. Proc., v. 36, p. 237-246, illus., **1962**; Mineral Industries, v. 32, no. 1, p. 1, 3-8, illus., **1962**. Small-scale maps show the distribution of 13 important chemical and physical characteristics. Ranges of variation are evident, and the region can be broadly subdivided into zones of relative uniformity. Such studies can play a role in the development of new markets.
2. (and Griess, Phyllis Rice). Atlas of Pennsylvania coal and coal mining, Part 2, Anthracite: Pennsylvania State Univ. Mineral Industries Exper. Sta. Bull. 80, 123 p., illus., **1963**. Numerous small-scale maps are used to show the features of the industry in northeastern Pennsylvania. Structure, stratigraphy coal correlations, and other geological data are included. Analyses are given.
3. Distribution of major Pennsylvania anthracite mine accidents caused by gas explosions [abs.]: Assoc. Am. Geographers Annals, v. 53, no. 4, p. 585-586, **1963**.
4. (and Griess, Phyllis Rice, and Balazik, Ronald F., and Burtnett, John W.). Atlas of Pennsylvania's mineral resources—Part 1, Supplement, Limestones and dolomites of Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. M 50, 83 p., illus., **1967**. Data concerning 137 limestone and dolomite mines are given on numerous maps. There are wide geographical differences in all aspects of the limestone and dolomite industry in Pennsylvania.
5. (and Griess, Phyllis Rice). Atlas of Pennsylvania's mineral resources—Part 2B, Economics of Pennsylvania's clay and shale production: Pennsylvania Geol. Survey, 4th ser. Bull. M 50, 49 p., illus., **1969**. Data concerning clay and shale from 106 mines is summarized and presented on numerous maps showing distribution and use. Very little geological data are included.

DE BOER, JELLE.

1. Paleomagnetic-tectonic study of Mesozoic dike swarms in the Appalachians: Jour. Geophys. Research, v. 72, no. 8, p. 2237-2250, illus., **1967**. Paleomagnetic evidence, some from southeastern Pennsylvania, indicates that most of the dike swarms cutting Triassic and older formations prob-

ably intruded in a time of regional tectonic and magmatic activity distinct from the late Triassic tectogenesis. They may be Jurassic.

DE CARLO, JOSEPH ANTHONY.

1. (and Sheridan, Eugene Thomas, Jr., and Murphy, Zane E.). Sulfur content of United States coals: U. S. Bur. Mines Inf. Circ. 8312, 44 p., illus., **1966**. The sulfur content of Pennsylvania coals, both bituminous and anthracite, is given in tables. Much is considered low-sulfur coal, but the content varies considerably. Percentages for each county are given. Clarion has the highest sulfur coals.

DECKER, CHARLES ELIJAH, 1868-1958.

1. Stratigraphic significance of graptolites of Athens Shale: Am. Assoc. Petroleum Geologists Bull., v. 36, no. 1, p. 1-145, illus., **1952**. Eight genera and 17 species of graptolites from the Ordovician Dauphin Formation in Dauphin County are listed, and are considered Trentonian in age. It is part of a large, worldwide fauna which can be recognized.

DEEVEY, EDWARD SMITH, *see* Stuiver, Minze, 1.

DEIKE, RUTH GAIL.

1. Karst development in Brush Valley [Centre County], Pa.: Nittany Grotto News, v. 9, no. 7, p. 121-128, illus., **1961**; Speleo Digest 1961, p. 11-18, illus., **1963**. This is a semi-popular account of the origin of the karst in the folded Ordovician limestones in the valley. Bedding and fractures influence the karst.
2. Relations of jointing to orientation of solution cavities in limestones of central Pennsylvania: Am. Jour. Sci., v. 267, no. 10, p. 1230-1248, illus., **1969**. Studies of the orientation of the passages in 26 caves show that they can be used as one determinant of the local fracture system, and a selective solution process may be related to the mechanical origin of the fractures as well as their frequency.

DEINES, PETER.

1. The carbon and oxygen isotopic composition of carbonates from a mica peridotite dike near Dixonville, [Indiana County] Pennsylvania: Geochim. et Cosmochim. Acta, v. 32, no. 6, p. 613-625, illus., **1968**. Carbonate inclusions in the dike contain the heaviest terrestrial C discovered so far and the $\delta^{13}\text{C}$ is 12.6 ‰ to 24.8 ‰. The C and O isotopes vary systematically through the cross section of the dike, and extremely steep $\delta^{13}\text{C}$ gradients exist.
2. (and Gold, David Percy, and Herzog, Leonard Frederick, Jr.). Variability of C^{13} and O^{18} in carbonates from a mica peridotite dike near Dixonville [Indiana County] Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 101, p. 51-52, **1968**.

DELEVAUX, MARYSE HELEN, *see* Stern, Thomas Whital, 1.

DELEVORYAS, THEODORE.

1. (and Taylor, Thomas Norwood). A probable pteridosperm with eremopterid foliage from the Allegheny Group of northern Pennsylvania [abs.]: *Am. Jour. Botany*, v. 55, no. 6, p. 725-726, **1968**.

DE MUNTER-THOMPSON, D. V., *see* Manten, A. A., 1.

DENISON, ROBERT HOWLAND.

1. A review of the habitat of the earliest vertebrates: *Fieldiana—Geology*, v. 11, no. 8, p. 359-455, illus., **1956**. Cyathaspic and acanthodid fish are in Silurian rocks in Perry County. The rocks are of marine origin, but from very near-shore deposits. Particular attention is paid to the salinity of the seas of the time.
2. The Cyathaspididae—a family of Silurian and Devonian jawless vertebrates: *Fieldiana—Geology* v. 13, no. 5, p. 309-473, illus., **1964**. A treatise on the entire family includes descriptions and discussions of *Americaspis americana* from the Silurian Landisburg Sandstone in Perry County, and *Vernonaspis vaningeni* and *V. bryanti* from the Bloomsburg Formation in Monroe County.

DENISON, RODGER ESPY, *see* Muehlenberger, William Rudolf, 1.

DENNISON, JOHN MANLEY, *see also* Oliver, William Albert, Jr., 2, 4.

1. Stratigraphy of Onquesquethaw Stage of Devonian in West Virginia and bordering states: *West Virginia Geol. Survey Bull.* **22**, 87 p., illus., **1961**. Exposures in Bedford County and subsurface information from southwestern Pennsylvania are included. The Tioga metabentonite is the datum of reference at the top. Many small-scale maps of the various formations are included.
2. (and Woodward, Herbert Preston). Palinspastic maps of central Appalachians: *Am. Assoc. Petroleum Geologists Bull.*, v. 47, no. 4, p. 666-680, illus., **1963**. Two different maps, each including a portion of southwestern Pennsylvania, show foreshortening occurred; restoration may require removal south and east from 25 to 65 miles. An exhortation for the use of such maps by Appalachian geologists is included.
3. (and Morrison, Anne K.). Facies relations of hystriospheres in Onquesquethaw Stage (Devonian) of central Appalachians [abs.]: *Am. Assoc. Petroleum Geologists Bull.*, v. 50, no. 3, p. 610, **1966**.
4. (and Textoris, Daniel Andrew). Stratigraphy and petrology of Devonian Tioga Ash fall in northeastern United States [abs.]: *Geol. Soc. America Spec. Paper* 101, p. 52, **1968**.
5. Tioga bentonite and other isochronous units in the Devonian Oriskany to Tully interval of the Appalachian basin [abs.]: *Geol. Soc. America Abstracts with Programs* 1969, pt. 1, p. 13, **1969**.

DENNY, CHARLES STORROW.

1. (and Lyford, Walter Henry). Wellsboro-Elmira-Towanda region, [Bradford-Tioga Counties] Pennsylvania-New York: Friends of Pleistocene [Eastern Group] 17th Reunion, 19 p., illus., **1954**. A general discussion of the Pleistocene drift sheets and the soils derived from them is followed

- by a road log for a 2 day field trip. The first day is 110 miles long and makes 7 stops, each of which is described. Geological features *en route* are also described. The second day is 62 miles long and makes 4 stops. Wellsboro is the starting and ending point.
2. (and Lyford, Walter Henry and Goodlett, John Campbell). Surficial geology and soils of the Elmira-Williamsport region, New York and [northern] Pennsylvania: U. S. Geol. Survey Prof. Paper 379, 60 p., illus. incl. geol. maps, **1963**. Parts of Bradford, Tioga, Sullivan and Lycoming Counties are included. Wisconsin-aged drift is described as is colluvium of Wisconsin or younger ages from which a Late Pleistocene geological history of the area is discussed. Soils are variable, and each type, primarily related to glacial-deposit types, is described. The vegetation of the region is not tied to the soil types.
 3. (and Warren, Charles Reynolds, and Dow, Donald Huse, and Dale, William J.). A descriptive catalog of selected aerial photographs of geological features in the United States: U. S. Geol. Survey Prof. Paper 590, 79 p., illus., **1968**. Six areas in Pennsylvania are included as good examples of geological features shown on aerial photographs. A brief description of each photo, as well as map data and geological references, are included.

DENNY, MARION VAUGHN, *see* Drake, Avery Ala, Jr., 4.

DEPMAN, ALBERT JOSEPH.

1. (and Thoumsin, S. F.). Pleistocene deposits of Delaware Valley [southeastern Pennsylvania]—some engineering considerations [abs.]: Geol. Soc. America Spec. Paper 101, p. 256, **1968**.
2. (and Parrillo, Daniel G.). Field trip no. 5 continued. Geology of the Tocks Island area [Monroe County] and its engineering significance, *in* Geology of selected areas in New Jersey and eastern Pennsylvania: New Brunswick, New Jersey, Rutgers Univ. Press, p. 354-362, illus., **1969**. The damsite is in the valley cut into Silurian and Devonian folded rocks and which is filled with Pleistocene glacial deposits. The anticipated engineering geology problems are discussed. A 16-mile trip around the area is included.

DEUSER, WERNER GEORG.

1. Rubidium-strontium age determinations of muscovites and biotites from pegmatites of the Blue Ridge and Piedmont [southeastern Pennsylvania]: MS Thesis, Pennsylvania State Univ., **1961**.

DE WIT, REINOUT.

1. Memorial—A[rville] I[rving] Lcvorsen, 1894-1965: Bull. Canadian Petroleum Geology, v. 13, no. 2, p. 363, **1965**.

DE WITT, WALLACE, JR., *see also* Oliver, William Albert, Jr., 2, 4.

1. (and Colton, George Willis). Bedrock geology of the Evitts Creek and Patterson Creek Quadrangles, Maryland, [Bedford County] Pennsylvania, and West Virginia: U. S. Geol. Survey Bull. 1173, 90 p., illus. incl. geol. maps, **1964**. The Evitts Creek Quadrangle includes southern Bed-

ford County. Ordovician to Devonian rocks and Quaternary alluvium are present. Folds are the dominant structures. Limestone is the chief mineral resource.

2. Memorial to James Franklin Pepper (1898-1963): Geol. Soc. America Bull., v. 75, no. 4, p. P61-P66, port., **1964**.
3. Correlation of the Lower Mississippian rock in western Maryland and adjacent states [abs.]: Geol. Soc. America Spec. Paper 121, p. 431, **1969**.

DICKESON, MONTROEVILLE WILSON, *see* Roberts, William F., 1.

DICKEY, PARKE ATHERTON, *see also* Fettke, Charles Reinhard, 14, 15.

1. Patterns of chemical composition in deep subsurface waters: Am. Assoc. Petroleum Geologists Bull., v. 50, no. 11, p. 2472-2478, illus., **1966**. The majority of the world's oil-field waters are in a stagnant class, the principal cation being Na^+ , but both Ca^{++} and Mg^{++} are present. Devonian waters from western Pennsylvania are used in a graph along with others from elsewhere to demonstrate the chemical similarities.

DIERKS, HENRY A., *see* Ash, Simon Harry, 7.

DIETZ, ROBERT SINCLAIR.

1. (and Holden, John C.). Miogeoclincs (miogeosynclines) in space and time: Jour. Geology, v. 74, no. 5, pt. 1, p. 566-583, illus., **1966**. The general proposal that continental shelf sedimentation is similar to geosynclinal sedimentation, and that a geosynclinal trough need not have existed, is proposed. The Appalachian Geosyncline, with examples from Pennsylvania, is thought to be one of these.

DIMENT, WILLIAM HORACE, *see* Revetta, Frank A., 1.

DOBBINS, DAVID A.

1. Stratigraphy of Middle and Upper Devonian strata of the northeastern part, Orbisonia Quadrangle [Huntingdon County] Pennsylvania: MS Thesis, Univ. Minnesota, **1959**.

DONAHUE, DAVID A. T.

1. Can aerial photography improve oil recovery? Oil and Gas Jour., v. 65, no. 28, p. 201-203, illus., **1967**. The theory is advanced that large fracture zones, or joints, could be detected from aerial photographs and used in the evaluation of areas for potential oil reservoirs and later hydraulic fracturing activity.

DONALDSON, ALAN CHASE, *see also* Roncs, Morris, 2.

1. Interpretation of depositional environments of Lower Ordovician carbonates in central Appalachians: West Virginia Acad. Sci. Proc. 1959-1960, v. 31-32, p. 153-161, illus., **1960**. The Lower Ordovician carbonates of central Pennsylvania are included. The Stonehenge Limestone is used as an example of the factors and techniques involved. Cycles are interpreted, and algal structures are present.

2. Introductory discussion of Stonehenge Limestone, in Lower Paleozoic carbonate rocks in Maryland and Pennsylvania: Johns Hopkins Univ. Studies Geology, no. 18, p. 42-47, illus., 1960. The formation is lithologically very complex, and examples of the rock types and the interrelationships of each type are described from locations in Centre County.
3. Stratigraphy of Lower Ordovician Stonehenge and Larke Formations in central Pennsylvania: PhD Thesis, Pennsylvania State Univ., 1959; [abs.], Dissert. Abs., v. 20, no. 9, p. 3693-3694, 1960.
4. Petrology of the Lower Ordovician Stonehenge Limestone and Larke Dolomite of central Pennsylvania: West Virginia Acad. Sci. Proc. 1961, v. 33, p. 83-86, 1961. The mechanically deposited calcirudites and calcarenites contain varying amount of oolites, pseudoolites, fossils, pellets, and pebbles as grains; lime mud and possible triturated fossil and algal dust as matrix, and sparry calcite overgrowths, coronas, and interstitial interlocking crystals as cement. Dolomitization and chertification are also present.
5. A patelliform gastropod, *Palaelophacmaea criola*—A new genus and species from the Lower Ordovician of central Pennsylvania: West Virginia Acad. Sci. Proc. 1962, v. 34, p. 143-149, illus., 1962. The material comes from the Stonehenge Limestone in Centre County, and is described and illustrated.
6. Facies in Lower Ordovician carbonates in central Appalachians [abs.]: Geol. Soc. America Spec. Paper 87, p. 246, 1966.

DONATH, FRED ARTHUR.

1. Experimental study of kink-band development in Martinsburg Slate, in Research in tectonics: Canada Geol. Survey Paper 68-52, p. 255-288, illus., 1969; discussions, p. 288-293, 362. Laboratory studies made on slate from southeastern Pennsylvania show the nature and origin of kink-band formation and deformation.

DONNAN, BRYSON CARLYLE.

1. Offshore exploration in Great Lakes region: Am. Assoc. Petroleum Geologists Bull., v. 45, no. 11, p. 1847-1858, illus., 1961. A generalized summary of the geology of the lakes includes a cursory description of the Silurian rocks in the Lake Erie area in which gas fields are known from Erie County, offshore in the lake. Gas comes from permeability trends in Lower Silurian.

DORMAN, HENRY JAMES, *see also* Oliver, Jack Ertle, 1.

1. (and Ewing, William Maurice). Numerical inversion of surface-wave dispersion data and crust-mantle structure in the New York-Pennsylvania area [abs.]: Jour. Geophys. Research, v. 67, no. 9, p. 3554, 1962.

DORT, WAKEFIELD, JR.

1. Faulting on Bald Eagle Mountain [central Pennsylvania]: Pennsylvania Acad. Sci. Proc., v. 34, p. 131-135, illus., 1960. Folding and numerous transverse faults have resulted in overturned beds and in the crest of the mountain, in places, being supported by the Ordovician Oswego Formation rather than by the Silurian Tuscarora Formation as is mapped.

DOUGLASS, WILLIAM C.

1. Paul Billingsley [1887-1962]: Mining Engineering, v. 14, no. 8, p. 75-76, **1962**.

DOUTT, J. KENNETH, *see* Guilday, John E., 4.

DOW, DONALD HUSE, *see* Denny, Charles Storow, 3.

DOW, JOHN W.

1. Lower and Middle Devonian limestones in northeastern Ohio and adjacent areas: Ohio Div. Geol. Survey Rept. Inv. 42, 67 p., illus., **1962**. Subsurface information from Erie and Mercer Counties is included. Detailed logs are included. Correlations with outcropping Devonian limestones in Ohio are suggested.

DRAKE, AVERY ALA, JR., *see also* Davis, Robert Ellis, 1; Epstein, Jack Burton, 3.

1. (and Davis, Robert Ellis, and Alvord, Donald Clayton). Taconic and post-Taconic folds in eastern Pennsylvania and western New Jersey, *in* Geological Survey research 1960: U. S. Geol. Survey Prof. Paper 400B, p. B180-B181, **1960**. Evidence is presented to show that Taconic folding was much stronger in the area than post-Taconic folding, which was rather gentle and which is probably Appalachian.
2. (and McLaughlin, Dean Benjamin, and Davis, Robert Ellis). Geology of the Frenchtown Quadrangle, New Jersey- [Bucks County] Pennsylvania: U. S. Geol. Survey Geol. Quad. Maps of the U. S., Map GQ 133, scale, 1:24,000, text, **1961**. That part in Bucks County contains only Triassic and Quaternary rocks, which are described and discussed.
3. Carbonate rocks of Cambrian and Ordovician age, Northampton and Bucks Counties, eastern Pennsylvania and Warren and Hunterdon Counties, western New Jersey: U. S. Geol. Survey Bull. 1194L, p. L1-L7, illus., **1965**. The rocks are from bottom to top: Leithsville Formation, Allentown Dolomite, Rickenback Dolomite (new), Epler Formation (new), and Jacksonburg Limestone.
4. (and Denny, Marion Vaughn, and Hamlin, Howard Phillips). Evaluation of the Martinsburg Shale and two younger formations as sources of lightweight aggregate in the Delaware River area, [Northampton County] Pennsylvania-New Jersey, *in* Geological Survey research 1965: U. S. Geol. Survey Prof. Paper 525D, p. D156-D162, illus., **1965**. A sample of the Martinsburg is subjected to expansion tests and found to compare favorably with selected lightweight aggregates.
5. Geologic map [with sections] of the Easton Quadrangle, New Jersey- [Northampton County] Pennsylvania: U. S. Geol. Survey Geol. Quad. Maps of the U. S., Map GQ 594, scale, 1:24,000, **1967**.
6. (and McLaughlin, Dean Benjamin, and Davis, Robert Ellis). Geologic map [and sections] of the Riegelsville Quadrangle, [Bucks County] Pennsylvania-New Jersey: U. S. Geol. Survey Geol. Quad. Maps of the U. S., Map GQ 593, scale, 1:24,000, **1967**.
7. (and Epstein, Jack Burton). The Martinsburg Formation (Middle and Upper Ordovician) in the Delaware Valley, [southeastern] Pennsylvania-New Jersey: U. S. Geol. Survey Bull. 1244H, p. H1-H16, illus., **1967**.

Three members are recognized which are, from bottom to top: Bushkill (thin-bedded slate); Ramseyburg (greywacke-bearing); and Pen Argyl (slate) Members. Each is described.

8. Field trip no. 1A. Precambrian and lower Paleozoic geology of the Delaware Valley, New Jersey- [southeastern] Pennsylvania, in *Geology of selected areas in New Jersey and eastern Pennsylvania: New Brunswick, New Jersey, Rutgers Univ. Press, p. 51-131, illus., 1969.* The Precambrian metamorphic and igneous rocks of the Reading Prong and the Cambrian and Ordovician rocks to the north and south are described petrographically and stratigraphically. Some structural interpretations are included also. The field trip is 2 days long, is 218 miles long, and makes 15 stops.
9. (and Epstein, Jack Burton, and Aaron, John M.). Geologic map and sections of parts of the Portland and Belvidere Quadrangles, New Jersey- [Northampton County] Pennsylvania: U. S. Geol. Survey Misc. Geol. Invs. Map I 552, scale, 1:24,000, **1969.** Ordovician and Quaternary rocks are present in Pennsylvania. Nappes, folds, décollements, and overthrusts are recognized.

DRAKE, CHARLES LUM.

1. (and Woodward, Herbert Preston). Appalachian curvature, wrench faulting, and offshore structures: *New York Acad. Sci. Trans., ser. 2, v. 26, no. 1, p. 48-63, illus., 1963.* A great wrench fault detected at about 40° N in the Atlantic may be in part the cause of the offsetting of the Blue Ridge from the Reading Prong and the accompanying arcuate pattern of the folds to the west.

DRAKE, DAVID E., *see* Anderson, T. H., 1.

DREIMANIS, ALEKSIS, *see also* Goldthwait, Richard Parker, 1.

1. Pre-classical Wisconsin in the eastern portion of the Great Lakes region, North America: *Internatl. Geol. Cong. 21st, Proc. Sec. 4, p. 108-118, illus., 1960.* Garnets in glacial till of northwestern Pennsylvania show that the provenance was to the northeast.
2. Extinction of mastodons in eastern North America—testing a new climatic-environmental hypothesis: *Ohio Jour. Sci., v. 68, no. 6, p. 257-272, illus., 1968.* Mastodon remains are known from extreme northwestern Pennsylvania, southeastern Pennsylvania, and a few scattered occurrences. Their demise is attributed to the failure of spruce trees (their favorite food?) with the drying up of the climate.
3. Late Pleistocene lakes in the Ontario and the Erie basins [Erie County] in *Proceedings of the twelfth conference on Great Lakes research . . . : Ann Arbor, Michigan, Internatl. Assoc. Great Lakes Research, p. 170-180, illus., 1969.* No undisputable pre-Illinoian evidence is available. Various stands of Wisconsin glacial Lake Erie are described; some of the shorelines occur in Erie County, Pennsylvania.

DREW, LAWRENCE J., *see* Parizek, Richard Rudolph, 1, 2.

DRYDEN, ABRAHAM LINCOLN.

1. (and Dryden, Clarissa). Source-rock heavy minerals of the Pennsylvania area: *Priv. pub., Bryn Mawr, Pennsylvania, illus., 1964.* Samples from

the Piedmont, Chester Valley, Honeybrook Upland, Reading Prong, South Mountain, and Triassic diabase are examined for heavy mineral content, with a view toward determining provenance for Coastal Plain sediments. Data on about sixteen heavy minerals are tabulated.

DRYDEN, CLARISSA, *see* Dryden, Abraham Lincoln, 1.

DUANE, DAVID BIERLEIN, *see* Berg, Dennis W., 2.

DUDA, J. R.

1. (and Pierce, Clyde I.). A comparison between log and core analyses from Appalachian area oil wells: *Producers Monthly*, v. 32, no. 5, p. 2-3, 22-23, illus., **1968**. Cores of the Cooper Sand in McKean County, the Glade Sand in Warren County, and the Clarendon Sand in Warren County, and others from elsewhere, are compared petrographically and geophysically. Discrepancies occur between the two and show that the sampling frequency of one sample per foot of core does not provide good representation of heterogeneous rock.

DUFFY, LEO JOSEPH.

1. The chemistry of vitrinitic macerals from coals in the bituminous range: PhD Thesis, Pennsylvania State Univ., **1967**; [abs.], *Dissert. Abs. B*, v. 28, no. 6, p. 2478B, **1967**.

DUNBAR, CARL OWEN.

1. Memorial to James Brookes Knight (1888-1960): *Geol. Soc. America Proc.* 1960, p. 119-122, port., **1962**.

DUNCAN, DONALD CAVE.

1. (and Swanson, Vernon Emanuel). Organic-rich shale of the United States and world land arcas: *U. S. Geol. Survey Circ.* 523, 30 p., illus., **1965**. Devonian and Mississippian black shales are included, and these underlie all of western and central Pennsylvania; the reserves of potential oil are not mentioned.

DUNHAM, KINGSLEY CHARLES.

1. Esper Signius Larsen, Jr. [1879-1961]: *Geol. Soc. London Proc.* 1961-62, no. 1602, p. 157, **1962**.

DUNN, JOHN ROBERT, *see also* Schmidt, Victor A., 1.

1. (and Schmidt, Victor A.). Lemon Hole Cave [western Pennsylvania]: *Netherworld News*, v. 9, no. 12, p. 213-216, illus., **1961**; *Speleo Digest* 1961, p. I60-I63, illus., **1963**.
2. (and Edwards, J.). Barton Cave (Fayette County, Pennsylvania): *Speleo Digest* 1960, p. I39-I40, illus., **1962**.
3. Brooks Spring Cave (Fayette County, Pennsylvania): *Speleo Digest* 1960, p. I40-I41, illus., **1962**.
4. Coon Cave (Westmoreland County, Pennsylvania): *Speleo Digest* 1960, p. I52-I55, illus., **1962**.

5. Copperhead Cave (Westmoreland County, Pennsylvania): Speleo Digest 1960, p. I56-I58, illus., **1962**.
6. Cowanshannock Cave (Armstrong County, Pennsylvania): Speleo Digest 1960, p. I37-I38, illus., **1962**.
7. Evac Cave (Westmoreland County, Pennsylvania): Speleo Digest 1960, p. I58-I59, illus., **1962**.
8. Freeman Falls Cave (Westmoreland County, Pennsylvania): Speleo Digest, 1960, p. I59-I60, illus., **1962**.
9. Lycippus Cave (Westmoreland County, Pennsylvania): Speleo Digest 1960, p. I62-I63, illus., **1962**.

DUNN, PETER AYRES.

1. Alluvial chromite deposits of southern Chester and Lancaster Counties, Pennsylvania: MS Thesis, Pennsylvania State Univ., **1962**.

DURDEN, CHRISTOPHER.

1. Studies on the phylogeny of the blattiform Orthoptera: PhD Thesis, Yale Univ., **1968**.
2. Pennsylvanian correlation using blattoid insects: Canadian Jour. Earth Sci., v. 6, no. 5, p. 1159-1177, illus., **1969**. Cockroaches from Pennsylvania are listed and described biostratigraphically. The rest of the fauna associated with them, as well as the roaches, can then be used to correlate with other lacustrine deposits around the world.

DURFOR, CHARLES NORMAN.

1. (and Anderson, Peter W.). Chemical quality of surface waters in Pennsylvania: U. S. Geol. Survey Water-Supply Paper 1619W, p. W1-W50, illus., **1963**. Included is a discussion of the influence of the geology in the drainage basins. There is an expected influence of the types of rocks on the chemistry of the surface water.

DURHAM, JOHN WYATT.

1. *Campostroma*, an early Cambrian supposed scyphozoan, referable to Echinodermata: Jour. Paleontology, v. 40, no. 5, p. 1216-1220, illus., **1966**. *Campostroma roddyi* was originally considered a scyphozoan, but more material from the Kinzers Formation in Lancaster and York Counties provide details which suggest it is a new echinoderm most closely allied with holothuroideans.

DURY, GEORGE HARRY.

1. Principles of underfit streams: U. S. Geol. Survey Prof. Paper 452A, p. A1-A56, illus., **1964**. A small-scale map of the United States shows the locations of manifestly underfit streams in relation to physical subdivisions. Several occur in the "Appalachian Highlands" of Pennsylvania, but stream names and locations are not included. They appear to be remarkably related to climatic subdivisions.

DUTCHER, RUSSELL RICHARDSON, *see also* Hryekowian, Eugene, 2, 3; Mansfield, Silas Peck, 1; Reidenouer, David R., 2, 3.

1. (and Jones, Everette Bruce, and Lovell, Harold Lemuel, and Parizek, Richard Rudolph, and Stefanko, Robert). Mine drainage, part 1—Abatement, disposal, treatment: *Mineral Industries*, v. 36, no. 3, p. 1-7, illus., **1966**. Geological factors associated with disposal problems are cursorily reviewed. They include permeability of recharge rocks, characteristics of limestones, and structures.
2. (and Jones, Everette Bruce, and Lovell, Harold Lemuel, and Parizek, Richard Rudolph, and Stefanko, Robert). Mine drainage—part 2, The hydrogeologic setting: *Mineral Industries*, v. 36, no. 4, p. 1-7, illus., **1967**. A knowledge of the hydrogeologic conditions in a watershed can be used to predict some of the problems in mine-drainage. Mine drainage also influences the hydrogeologic regimen. Examples from throughout the state are cited.

DYSON, JAMES LINDSAY, 1912-1967.

1. Geology and mineral resources of the northern half of the New Bloomfield Quadrangle [Perry and Dauphin Counties]: Pennsylvania Geol. Survey, 4th ser. Atlas A 137 ab [Bull. A 137 ab], 63 p., illus. incl. geol. map, **1963**. A complete geological description is given. Silurian-Mississippian, Triassic, and Quaternary rocks are mapped. Folds are the major structural features. Sand and gravel and stone are the only mineral resources present.
2. Geology and mineral resources of the southern half of the New Bloomfield Quadrangle, [Cumberland, Dauphin, and Perry Counties] Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Atlas 137ed [Bull. A 137ed], 86 p., illus. incl. geol. map, **1967**. A complete geological description of the area is given. Ordovician-Mississippian, Triassic, and Quaternary rocks are mapped. Folds are the dominant structure. Stone is the only mineral resource of significance.

EARDLEY, ARMAND JOHN.

1. Structural geology of North America: New York, Harper and Row, 743 p., illus., 2nd ed., 1962; originally published **1951**. A textbook includes structural summaries of various parts of Pennsylvania.

EARLY, JAMES WILLIAM, *see* Hooper, William Franklin, 1.

EASTMAN, CHARLES ROCHESTER, 1868-1918.

1. Fossil fishes in the collection of the United States National Museum: U. S. Natl. Mus. Proc., v. 52, p. 235-304, illus., **1917**. Discussions are included about *Palaeaspis americana* (Silurian, Perry County); *Bothriolepis nitida* (Devonian, Tioga County); *Dipterus angustus* (Devonian, Bradford County); *Dinichthys tuberculatus* (Devonian, Warren County) and *Sauripterus taylori* (Devonian, Tioga County). Many are illustrated.

EATON, AMOS, 1776-1842.

1. Geological text-book, prepared for popular lectures on North American geology . . . : Albany, New York, Websters and Skinners, illus., 63 p., 1830; 2d ed., 134 p., **1832**.

EATON, GORDON PRYOR.

1. Windborne volcanic ash—a possible index to polar wandering: Jour. Geology, v. 72, no. 1, p. 1-35, illus., **1964**. A study of the distribution of modern-day ash falls with relation to air currents is followed by an exhortation to study the Ordovician and Devonian bentonites of the eastern United States (including Pennsylvania) with a view to determining past air-current distribution, and hence polar conditions.

EATON, W. L., *see* Ash, Simon Harry, 2.

EBY, JAMES BRIAN.

1. Joseph Theophilus Singewald, Jr. (1884-1962): Am. Assoc. Petroleum Geologists Bull., v. 48, no. 5, p. 732-735, port., **1964**.

ECKARD, WILLIAM ELMER, *see* Rough, Robert L., 1.

ECKELMANN, FRANK DONALD, *see* Long, Leon Eugene, 1.

EDDY, GREGORY E., *see* Fridley, Harry Marion, 2.

EDGERTON, CURTIS D., JR.

1. Peat bog investigations in northeastern Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 65, 53 p., illus., **1969**. Nine bogs are described, each with over 100,000 tons of peat. Most are the reed-sedge variety although some peat humus and small amounts of sphagnum are also present. Analyses are included.

EDMUNDS, WILLIAM E.

1. (and Koppe, Edwin Frederick). Coal in Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Educ. Ser., no. 7, 28 p., illus., **1968**. This is a popular account of the origin of coal followed by a cursory description of its occurrence in the state. Illustrations of common plant fossils in the Pennsylvanian rocks are included. A glossary of coal names is included also.
2. Geology and mineral resources of the northern half of the Houtzdale 15-minute quadrangle [Clearfield County] Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Atlas A 85ab [Bull. A 85ab], 150 p., illus. incl. geol. map, **1968**. Mississippian and Pennsylvanian rocks are mapped; gentle undulations and numerous faults are the major structures. Extensive revisions of the stratigraphic nomenclature is offered, and much information about the Pennsylvanian coal formations is included. At least 112,000,000 short tons of coal are in reserve.

3. Revised lithostratigraphic nomenclature of the Pottsville and Allegheny Groups (Pennsylvanian), Clearfield County, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 61, 36 p., illus., **1969**. Detailed stratigraphic discussions include seven new formation names, alteration of old names and abandonment of some others.

EDWARDS, J., *see* Dunn, John Robert, 2.

EHRLICH, ROBERT, *see* Fern, John Charles, 7.

ELA, ROBERT E., *see* Thomson, Robert D., 1-4; Yeloushan, Charles C., 1.

EL-BAS, FAROUK, *see* Haentzschel, Walter, 1.

ELLISON, ROBERT LEE.

1. Middle Devonian Mahantango Formation in parts of south central Pennsylvania: PhD Thesis, Pennsylvania State Univ., 1961; [abs.], Dissert. Abs., v. 22, no. 11, p. 3981-3982, **1962**.
2. Faunas of the Mahantango Formation in south-central Pennsylvania, *in* Symposium on Middle and Upper Devonian stratigraphy of Pennsylvania and adjacent states: Pennsylvania Geol. Survey, 4th ser. Bull. G 39, p. 201-212, illus., **1963**. Three units can be identified lithologically and paleontologically. The faunas of each unit are analyzed and compared with other faunas from other units, and tentative correlations are suggested.
3. Stratigraphy and paleontology of the Mahantango Formation in south-central Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. G 48, 298 p., illus., **1965**. Nine members are recognized in the area, and are extensively described. Numerous sections are measured; coclenterates, bryozoans, brachiopods, pelecypods, gastropods, nautiloids, ammonoids, trilobites, ostracods, and crinoids are described and illustrated.

EMERY, JOHN RATHBONE.

1. The application of a discriminant function to a problem in petrology: MS Thesis, Pennsylvania State Univ., **1954**.
2. (and Griffiths, John Cedric). Differentiation of oil-bearing from barren sediments by quantitative petrographic analysis, *in* Eighteenth technical conference on petroleum production [1954]: Pennsylvania State Univ. Mineral Industries Exper. Sta. Bull. 64, p. 63-67, illus., [1954]. Sixteen samples of oil-bearing Berea Sandstone from Ohio were distinguished from 16 samples of barren "Pocono" Sandstone by discriminant function analysis. Some of the Pocono rocks are from Pennsylvania.

EMRICH, GROVER HARRY, *see also* Thompson, Dale R., 1.

1. The effects of coal mining on ground water [Pennsylvania] [abs.]: Mining Engineering, v. 17, no. 8, p. 49, **1965**.

2. Ground water geology: Pennsylvania Dept. Health, Div. Sanitary Engineering Pub. 11, 27 p., illus., **1966**. Examples are drawn from Pennsylvania in this semi-popular account of the origin and occurrence of ground water.
3. (and Merritt, Gary L.). Effects of mine drainage on ground water [Clarion County]: Ground Water, v. 7, no. 3, p. 27-32, illus., **1969**. Ground water in the Tom's Run drainage basin is contaminated by by-products of coal mining and oil and gas drilling. The oil and gas wells serve as conduits to permit mine waters to enter the Mississippian and Pennsylvanian sandstones of the area.

ENGEL, ALBERT EDWARD JOHN, *see* Chidester, Andrew Herman, 3.

ENGELN, OSKAR DIEDRICH VON.

1. (and Wells, John West). Memorial to Henry Leighton (1884-1963): Geol. Soc. America Bull., v. 75, no. 1, p. P7-P9, port., **1964**.

ENGLE, CARL F., *see* Johnson, Leon Joseph, 1; Van Eck, William Adolph, 1.

EPPLEY, ROBERT ASHTON.

1. Earthquake history of the United States—Pt. 1, Stronger earthquakes of the United States (exclusive of California and western Nevada): U. S. Coast and Geod. Survey Spec. Pub. 41-1 (revised edition through 1963), 120 p., illus., **1965**; originally published 1938. Numerous quakes are tabulated chronologically beginning in 1963. Twelve had epicenters in Pennsylvania. The data are tabulated.

EPSTEIN, ANITA G., *see also* Epstein, Jack Burton, 2, 4.

1. (and Epstein, Jack Burton, and Spink, Walter John, and Jennings, David S.). Upper Silurian and Lower Devonian stratigraphy of northeastern Pennsylvania, New Jersey, and southeasternmost New York: U. S. Geol. Survey Bull. 1243, 74 p., illus., **1967**. Complex facies changes, exposed along the Delaware River, are discussed. Revision of the stratigraphy is proposed, and interpretations of depositional environments are offered.

EPSTEIN, JACK BURTON, *see also* Davis, Robert Ellis, 1; Drake, Avery Ala, Jr., 7, 9; Epstein, Anita G., 1.

1. Structural control of wind gaps and water gaps and of stream capture in the Stroudsburg area, [northeastern] Pennsylvania and New Jersey, *in* Geological Survey research 1966: U. S. Geol. Survey Prof. Paper 550B, p. B80-B86, illus., **1966**; reprinted *in* Geology of the region of the Delaware to Lehigh watergaps—Field Conf. Pennsylvania Geologists, 32d: Harrisburg, Pennsylvania Topog. and Geol. Survey, Appendix, **1967**. Wind gaps and water gaps are located where resistant rocks dip steeply and have a narrow width of outcrop, where folds die out over short distances, or where folding was more intense locally than nearby. Structural control of drainage could also influence stream capture.

2. (and Epstein, Anita G.). Geology of the region of the Delaware to Lehigh water gaps—Field Conf. Pennsylvania Geologists, 32d: Harrisburg, Pennsylvania Bur. Topog. and Geol. Survey, 96 p., illus., **1967**. A field conference designed to show the interrelationship of the stratigraphy, structure, geomorphology, glacial geology and economic geology of Middle Ordovician to Devonian rocks in eastern Pennsylvania is outlined. Facies and structures are described. One day of the trip begins in East Stroudsburg, is 95 miles long, makes 6 stops, and ends in East Stroudsburg. The second day is 32 miles long, proceeds to the east and south, makes 6 stops, and ends in East Stroudsburg.
3. [and D'Agostino, John P., and Drake, Avery Ala, Jr., and Lampiris, Nicholas]. Preliminary log of drill hole drilled near Reigelsville [Bucks County], Pennsylvania: U. S. Geol. Survey Repts. Open File, 2 p., illus., **1967**. The hole is 476 feet deep. Precambrian rocks are in the upper part and Paleozoic rocks were entered at 392 feet. An overthrust is confirmed.
4. (and Epstein, Anita G.). Field trip no. 1B. Geology of the Valley and Ridge Province between Delaware Water Gap and Lehigh Gap, [northeastern] Pennsylvania, in *Geology of selected areas in New Jersey and eastern Pennsylvania*: New Brunswick, New Jersey, Rutgers Univ. Press, p. 132-205, illus., **1969**. The stratigraphy, structure, glacial geology, geomorphology, and economic geology of Middle Ordovician through Middle Devonian rocks and overlying surficial deposits are discussed. Sand and gravel, slate, stone, and clay are the mineral resources present. The field trip lasts 2 days, is 120 miles long, and makes 9 stops.
5. (and Hosterman, John Wallace). Residual clay deposits in rocks of Early and Middle Devonian age near Kunkletown [Monroe County] Pennsylvania, in *Geological Survey research 1969*: U. S. Geol. Survey Prof. Paper 650D, p. D94-D105, illus., **1969**. White clay and saprolite are present and are related to pre-Wisconsinan weathering. The clay is in the New Scotland Formation, Shriver Chert, and the Buttermilk Falls Limestone. Details of the mechanics of the weathering are described.
6. Surficial geology of the Stroudsburg Quadrangle, [Monroe and Northampton Counties] Pennsylvania-New Jersey: Pennsylvania Geol. Survey, 4th ser. Bull. G 57, 67 p., illus. incl. geol. maps, **1969**. Evidence for two glacial tills is shown and evaluated. A conspicuous terminal moraine marks the latter, the Wisconsin. Glacial deposits of many types are present. The ice advanced south-southwestward.

ERDMAN, JOHN GORDON.

1. Some chemical aspects of petroleum genesis as related to the problem of source bed recognition, in *Symposium on the chemical approaches to the recognition of petroleum source rocks*: *Geochim. et Cosmochim. Acta*, v. 22, no. 1, p. 16-36, illus., **1961**. The presence and distribution of low molecular-weight hydrocarbons in some Pennsylvanian rocks from southwestern Pennsylvania are determined as part of a larger problem. The rocks are both freshwater and marine; they are believed to have been source beds.

ERGUN, SABRI, *see also* Bivins, Doris, 1; McCartney, James Thomas, 1; Menster, Morris, 1, 2.

1. Graphitelike layers in coals and high vacuum distillation products [southwestern Pennsylvania]: *Fuel*, v. 37, no. 4, p. 365-369, illus., **1958**. X-ray studies of the vitrinite of the Pittsburgh Coal show it to be a polymer of small, partially oriented planar units which depolymerize upon heating; some of the structural entities are set free as vapor, and others recombine to form a highly disordered carbon skeleton.
2. (and McCartney, James Thomas). Reflectance of coals, graphite and diamond: *Fuel*, v. 39, no. 6, p. 449-454, illus., **1960**. Several types of coal from Pennsylvania are included in the tests. The reflectance decreases in order of decreasing rank.
3. (and Menster, Morris, and O'Donnell, Hugh John). Three dimensional X-ray reflections from [northeastern Pennsylvania] anthracite and meta anthracite: *Science*, v. 132, no. 3435, p. 1314-1316, illus., **1960**. Examples from Pennsylvania are used to show that carbon does graphitize during metamorphism.
4. X-ray studies of coals and carbonaceous materials: *U. S. Bur. Mines Bull.* 648, 38 p., illus., **1968**. X-ray studies, with a view to using the resulting patterns to determine other properties, such as rank and uranium content, are carried out on numerous substances including anthracite from Luzerne and Northumberland Counties and grahamite from Washington County. Ultimate chemical analyses are also included.

ERICKSON, EDWIN SYLVESTER, JR.

1. Mineralogical, petrographic, and geochemical relationships in some high-alumina and associated claystones from the Clearfield basin [western] Pennsylvania: PhD Thesis, Pennsylvania State Univ., **1963**; [abs.], *Dissert. Abs.*, v. 25, no. 2, p. 1243, **1964**.

ESPENSHADE, GILBERT HOWRY.

1. Pyrophyllite, and kyanite and related minerals in the United States, exclusive of Alaska and Hawaii: *U. S. Geol. Survey Mineral Invs. Resource Map MR-18*, scale, 1:3,168,000, separate text, **1962**. Kyanite- and sillimanite-bearing schists are known only from Chester County.

EVANS, DONALD M., *see also* Overbey, William K., Jr., 1, 2.

1. Reservoir investigations, Cooper Sand, Fork Run area, Ludlow Field, Wetmore Township, McKean County, Pa.: *Producers Monthly*, v. 31, no. 5, p. 18-20, illus., **1967**. The petrography, core analysis, and geophysical logs of the Devonian sand formation are included in an otherwise engineering report on the secondary recovery potential of the unit.

EWING, WILLIAM MAURICE, *see also* Dorman, Henry James, 1; Kuo, John Tsung Fen, 1.

1. (and Crary, Albert Paddock, and Lohse, J. M.). Seismological observations in quarry-blasting [Northampton and Lehigh Counties]: *Am. Geophys. Union Trans.*, v. 15, p. 91-94, illus., **1934**. Quarry blasts are recorded, and various seismological factors of the area are noted. The

waves recorded did not penetrate very deep, and travel times are different in different directions.

2. (and Crary, Albert Paddock). Propagation of elastic waves in limestone [Lehigh County]: Am. Geophys. Union Trans., v. 16, p. 100-103, illus., **1935**. Quarry blasts were used to determine elastic wave velocity for the region as well as certain geological structures.

EYRICH, HENRY T., *see* Mills, Joseph William, 1.

FAAS, RICHARD WILLIAM.

1. (and Flocks, John M.). Some acoustic properties of the Ringing Rocks diabase, Kintnersville, [Bucks County] Pennsylvania [abs.]: Pennsylvania Acad. Sci. Proc., v. 40, no. 1, p. 12, **1966**.

FAILL, RODGER TANNER.

1. Valley and Ridge structure in Pennsylvania—folds or macro kink bands? [abs.]: Am. Geophys. Union Trans., v. 48, no. 1, p. 214, **1967**.
2. Tectonic development of the Triassic basin in [southeastern] Pennsylvania: Geol. Soc. America Abstracts with Programs 1969, pt. 7, p. 273-275, **1969**. The "half graben" and "full graben" models are not supported by field evidence. A new model, which includes downwarping followed by crustal rotation is proposed. The resulting extension permitted the intrusion of the basalt along faults which had developed.

FAIRALL, VIRGINIA, *see* Lytle, William Stuckley, 6, 12.

FAIRBAIRN, HAROLD WILLIAMS, *see* Hart, Stanley Robert, 1.

FALLA, WILLIAM S., JR., *see also* Williams, Eugene Griffin, 10.

1. The petrology and geochemistry of the Clarion Flint Clay, western Pennsylvania: MS Thesis, Pennsylvania State Univ., **1967**.

FANALE, FRASER PARTINGTON.

1. (and Kulp, John Laurence). Dating of magnetite and other ore minerals by the U, Th-He method [Lebanon County] [abs.]: Geol. Soc. America Spec. Paper 68, p. 174-175, **1962**.
2. (and Kulp, John Laurence). The helium method and the age of the Cornwall, [Lebanon County] Pennsylvania magnetite ore: Econ. Geology, v. 57, no. 5, p. 735-746, illus., **1962**; discussion by William D. Green and Paul Edward Damon, v. 58, no. 1, p. 143-145, **1963**. If the extra-lattice uranium and thorium are removed by leaching, the method gives an age for the ore of 194 ± 4 my in agreement with K-Ar ages of 195 ± 5 my on associated muscovite and 197 ± 5 my on biotite from the diabase.
3. (and Kulp, John Laurence). Uranium, thorium-helium dating of magnetite [Lebanon County] [abs.]: Geol. Soc. America Spec. Paper 76, p. 57, **1964**.
4. Helium in magnetite [Lebanon County]: PhD Thesis, Columbia Univ., **1964**; [abs.], Dissert. Abs., v. 26, no. 7, p. 3861, **1966**.

FARLEKAS, GEORGE M.

1. The geology of part of South Mountain of the Blue Ridge Province north of the Pennsylvania-Maryland border [Adams and Franklin Counties]: MS Thesis, Pennsylvania State Univ., **1961**.

FAUL, HENRY.

1. History of intrusion and metamorphism in the Appalachians and in the Urals [abs.]: Geol. Soc. America Spec. Paper 68, p. 176, **1962**.

FAUST, GEORGE TOBIAS.

1. The hydrous nickel-magnesium silicates—the garnierite group: Am. Mineralogist, v. 51, nos. 3-4, p. 279-298, illus., **1966**. Genthite, from the Wood Mine in Lancaster County, is a fine-grained mixture of pimelite and a nickeloan serpentine-group mineral. Colored illustrations are included.
2. Memorial of Alfred Cary Hawkins—June 15, 1887-March 30, 1954: Am. Mineralogist, v. 54, nos. 3-4, p. 619-625, port., **1969**.

FAUTH, JOHN LOUIS.

1. Geology of South Mountain, northwestern Adams County, Pennsylvania: MS Thesis, Pennsylvania State Univ., **1962**.
2. Geology of the Caledonia Park Quadrangle area, South Mountain [Adams, Cumberland, and Franklin Counties] Pennsylvania: PhD Thesis, Pennsylvania State Univ., **1967**; [abs.], Dissert. Abs. B, v. 28, no. 6, p. B2478-B2479, **1967**; Pennsylvania Geol. Survey, 4th ser. Atlas 129a, [Bull.] A 129a] 133 p., illus. incl. geol. map, **1968**. Parts of the Scotland, Caledonia Park, and Arendtsville Quadrangles are included. Precambrian-Ordovician, and Cenozoic rocks are mapped. Faulted folds are the predominant structures. Much attention is given to the petrography of the rocks.
3. Structural development of a portion of the Blue Ridge, [Adams and Franklin Counties] south-central Pennsylvania [abs.]: Geol. Soc. America Abstracts with Programs, 1969 pt. 1, p. 17, **1969**.

FEDEN, ROBERT H.

1. A petrofabric analysis of some carbonate rocks from the Chester-Whitemarsh Valley [Chester County]: MA Thesis, Bryn Mawr College, **1963**.

FELL, HOWARD BARRACLOUGH.

1. The biogeography and paleoecology of Ordovician seas, in *Evolution and environment*: New Haven, Yale Univ. Press, p. 139-162, illus., **1968**. The distribution of Ordovician animals in a zoogeographic sense is illustrated and interpreted. Pennsylvania is included. The broad distribution of Ordovician faunas in no way matches that of the present-day earth.

FERGUSON, HARRY FRANCIS.

1. Engineering geology—Allegheny dam, Warren [Warren County] Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 87, p. 56, **1966**.

2. Valley stress release in the Allegheny Plateau [western Pennsylvania]: *Engineering Geology*, v. 4, no. 1, p. 63-71, illus., **1967**. Stress differential occurring between valley walls and valley floors in areas of flat-lying rocks is described. Compression faults occur in the valley bottoms and tension faults occur in the walls. The engineering implications are discussed.

FERGUSON, WILLIAM BLAKE.

1. (and Prather, Bruce A.). Salt deposits in the Salina Group in Pennsylvania: *Pennsylvania Geol. Survey*, 4th ser. Bull. M 58, 41 p., illus., **1968**. Small-scale isopach and lithofacies maps show the various units and amount of salt present in each unit of the Salina Group throughout the state.
2. (and Prather, Bruce A.). Stratigraphy of the [Silurian] Salina Group in [western] Pennsylvania [abs.]: *Geol. Soc. America Spec. Paper* 115, p. 262, **1968**.

FERM, JOHN CHARLES, *see also* Williams, Eugene Griffin, 4, 6, 7, 8.

1. (and Williams, Eugene Griffin). Stratigraphic variation in some Allegheny rocks of western Pennsylvania: *Am. Assoc. Petroleum Geologists Bull.*, v. 44, no. 4, p. 495-497, illus., **1960**. Non-detrital rocks, such as coal and ironstone, have interrupted otherwise widespread detrital sedimentation and so make good marker beds. Some are subregional and form couplets with the widespread units; cyclic sedimentation is suggested.
2. (and Williams, Eugene Griffin). Allegheny paleogeography in the northern Appalachian Plateau [abs.]: *Science*, v. 138, no. 3544, p. 990, **1962**.
3. Petrology of some Pennsylvania sedimentary rocks [Jefferson County]: *Jour. Sed. Petrology*, v. 32, no. 1, p. 104-123, illus., **1962**. The Kittanning Formation is composed mainly of detrital rocks—sandstone, siltstone, and claystone, with minor volumes of coal, limestone, and ironstone. Details are given in tables, and depositional environments and provenances are described.
4. (and Williams, Eugene Griffin). Model for cyclic sedimentation in the Appalachian Pennsylvanian [abs.]: *Am. Assoc. Petroleum Geologists Bull.*, v. 47, no. 2, p. 356-357, illus., **1963**.
5. Allegheny stratigraphy in the Appalachian plateau [western Pennsylvania] [abs.]: *Geol. Soc. America Spec. Paper* 82, p. 60, **1965**.
6. (and Williams, Eugene Griffin). Characteristics of a Carboniferous marine invasion in western Pennsylvania: *Jour. Sed. Petrology*, v. 35, no. 2, p. 319-330, illus., **1965**. A 60-foot thick section overlies the lower Kittanning coal in western Pennsylvania and consists of a marine-brackish facies both overlain by and laterally intertongued with non-marine strata. This is an excellent, well-established record of an Allegheny marine transgression and regression.
7. (and Ehrlich, Robert). Tectonic chronology of Pennsylvanian borderlands [abs.]: *Am. Assoc. Petroleum Geologists Bull.*, v. 49, no. 3, p. 340, **1965**.
8. (and Cavaroc, Victor V., Jr.). A field guide to Allegheny deltaic deposits in the upper Ohio Valley, with a commentary on deltaic aspects of Carboniferous rocks in the northern Appalachian Plateau: *Ohio Geol. Soc.*,

and Pittsburgh Geol. Soc., 21 p., illus. incl. ports. [1969]. A discussion of the origin of the coal-bearing rocks of western Pennsylvania includes a field trip in which four stops are in Beaver and Lawrence Counties. The coals were deposited in deltaic complexes. Nomenclatural problems are reviewed. Many cross sections are included. The field trip includes four stops between Cannelton, Pennsylvania and the Ohio Turnpike.

FETERMAN, JAMES WILLIAM.

1. Alumina extraction from a Pennsylvania diaspore clay by an ammonium sulfate process: PhD Thesis, Pennsylvania State Univ., 1961; [abs.], Dissert. Abs., v. 22, no. 11, p. 4033-4034, 1962.

FETH, JOHN HENRY.

1. (and others). Preliminary map of the conterminous United States showing depths to and quality of shallowest ground water containing more than 1,000 parts per million dissolved solids: U. S. Geol. Survey Hydrol. Invs. Atlas HA-199, 2 sheets, scale, 1:3,168,000, 31 p. text, 1965. Data from 13 wells in Pennsylvania are included. One map shows the depths (most are 1,000 to 3,000 feet) with fresh water occurring above. Analyses are included.
2. Nitrogen compounds in natural water—A review: Water Resources Research, v. 2, no. 1, p. 41-58, illus., 1966. The Monongahela and Schuylkill Rivers in Pennsylvania are analyzed for their nitrogen content. The latter is very high.

FETTKE, CHARLES REINHARD, 1888-1959.

1. Core studies of the Second Sand of the Venango Group from Oil City [Venango County], Pa.: Am. Inst. Mining and Metallurgical Engineers Petroleum Development and Technology in 1926, p. 219-231, illus., 1927; discussions, p. 231-234 [not seen].
2. Ten years' application of compressed air at Hamilton Corners, [Venango County] Pa., with core studies of the producing sand: Am. Inst. Mining Engineers Trans., v. 77, p. 303-316, illus., 1928; discussion, p. 317; with title, Application of compressed air and core studies: Oil Field Engineering, v. 3, no. 5, p. 51-56, illus., 1928. Considerable petrographic information about the Venango First Sand is included. The sand has a shale unit within it, and the production is from the sand below the shale.
3. Core studies of the Bradford Sand from the Bradford field [McKean County] Pennsylvania, in Petroleum Development and Production 1928-29: Am. Inst. Mining and Metall. Engineers Trans., v. 82, p. 221-237, illus., 1929; discussion, p. 237-239. Petrographic studies of the sand from two cores are included. The origin and relation of porosity to grain size and shape are shown.
4. Appalachian petroleum and natural gas fields during 1929, in Petroleum Development and Production 1930: Am. Inst. Mining and Metall. Engineers Trans., v. 86, p. 544-547, illus., 1930. A general survey of activity for the year includes casual references to geological data.

5. Core studies of oil and gas sands with particular reference to the eastern fields: Am. Petroleum Inst., Div. Production Rept. 826-3R, p. 23-24, illus., **1930** [not seen].
6. (and Mayne, Richard D.). Permeability studies of Bradford Sand [McKean County]: Natl. Petroleum News, v. 22, no. 30, p. 61-66, 107, illus., **1930**. Samples from the Devonian Bradford Sand are used to show that it is possible to draw up diagrams for different sand bodies from which it is possible to estimate permeabilities from the porosities and screen analyses.
7. Recent development in flooding practice in the Bradford and Richburg fields [McKean County]: Am. Inst. Mining and Metallurgical Engineers Tech. Pub. 328, 30 p., illus., **1930**; Oil Weekly, v. 56, no. 12, p. 32-40, 42, illus., **1930**. Petrographic descriptions of the Devonian Bradford Sand are included in an otherwise engineering discussion of recent water-flooding practices.
8. (and Copeland, W. A.). Permeability studies of Pennsylvania oil sands, in *Petroleum Development and Technology 1931*: Am. Inst. Mining and Metallurgical Engineers Trans., v. 92, p. 329-336, illus., **1931**; discussion, p. 336-339. Eighteen samples from 7 locations in northwestern Pennsylvania, (all Devonian) are used to demonstrate that porosity is more important in determining relative permeabilities than actual grain size in sandstones, but grain size must be taken into consideration.
9. Production, reserves and future life of the Bradford field [McKean County]: Oil and Gas Jour., v. 36, no. 16, p. 61, **1937**. Over one billion barrels of oil is estimated to have been originally present, of which over 194 million barrels remain to be recovered by natural and water-flooding methods. Sixty percent will remain in the pool.
10. Subsurface waters of the Bradford field [McKean County]: Oil and Gas Jour., v. 36, no. 13, p. 49-51, 53, illus., **1937**. The origin of connate water in the Bradford Third sand is described. Numerous analyses are included.
11. The prospecting and sampling of undeveloped fire clay deposits: Am. Refractories Inst. Tech. Bull. 73, 10 p., **1938** [not seen].
12. Deep oil and gas sand explorations [western Pennsylvania]: Producers Monthly, v. 4, no. 6, p. 24-37, illus., **1940**. A complete but general discussion of the pre Devonian stratigraphy of western Pennsylvania is given. New interpretations can be made as a result of deep drilling. The Oriskany and Onondaga Formations have produced gas but no oil. Production from these and deeper formations may be obtained when structural controls are present. Silurian and Ordovician rocks contain oil and gas in nearby areas.
13. Oil and gas activities in Pennsylvania during 1940: Natl. Oil Scouts and Landsmen's Assoc. Yearbook 1941, v. 11, p. 458-463, illus., **1941**; . . . 1941: Yearbook 1942, v. 12, p. 462-467, illus., **1942**; . . . 1942: Yearbook 1943, v. 13, p. 490-496, illus., **1943**; . . . 1943: Yearbook 1944, v. 14, p. 486-492, illus., **1944**; . . . 1944: Yearbook 1945, v. 15, p. 547-553, illus., **1945**; . . . 1945: Yearbook 1946, v. 16, p. 564-571, illus., **1946**; . . . 1946: Yearbook 1947, v. 17, p. 533-540, illus., **1947**; . . . 1947: Yearbook 1948, v. 18, p. 500-511, illus., **1948**; . . . 1948:

- Yearbook 1949, v. 19, p. 520-528, illus., **1949**; . . . 1949: Yearbook 1950, v. 20, p. 540-551, illus., **1950**; . . . 1950: Yearbook 1951, v. 21, p. 526-537, illus., **1951**; . . . 1951: Yearbook 1952, v. 22, p. 573-590, illus., **1952**; . . . 1952: Yearbook, 1953, v. 23, p. 593-604, illus., **1953**; . . . 1953: Yearbook 1954, v. 24, p. 598-608, illus., **1954**.
14. (and Dickey, Parke Atherton, and Rogers, Douglas, Jr., and Torrey, Paul Dwight, and Wilhelm, Clarence John). Geological factors influencing secondary recovery, *in* Addresses and reports delivered at Twenty-fourth annual meeting . . . : Am. Petroleum Inst. Prod. Bull. 230, p. 151-154, **1943**; Oil and Gas Jour., v. 42, no. 27, p. 216-224, illus., **1944**; Producers Monthly, v. 8, no. 11, p. 18-21, **1944**; *in* Secondary recovery of oil in the United States: New York, Am. Inst. Mining and Metall. Engineers, p. 204-211, illus. **1950**. Various factors, such as porosity, permeability, joints, cementation, etc., are discussed as influences on secondary recovery.
 15. (and Dickey, Parke Atherton). Oil and gas developments during 1944 in Pennsylvania: Am. Inst. Mining and Metallurgical Engineers Trans., v. 160, p. 462-476, illus., **1945**.
 16. Oil and gas development during 1945 in Pennsylvania, *in* Am. Inst. Mining Metall. Engineers Statistics of Oil and Gas Development and Production, [for 1945]: New York, Am. Inst. Mining and Metall. Engineers, p. 240-247, illus., **1946**; . . . [for] (1946): . . . p. 235-242, illus., **1947**; . . . (covering 1947): . . . p. 285-295, illus., **1948**; . . . (covering 1948): . . . p. 277-286, illus., **1949**; . . . covering 1949: . . . p. 281-290, illus., **1950**; . . . during 1950: . . . covering 1950, v. 5, p. 273-275, illus., **1951**; . . . during 1951: . . . covering 1951, v. 6, p. 267-275, illus., **1952**; . . . [during 1952]: . . . vol. 7, covering 1952, p. 166-175, illus., **1953**; . . . [for 1953]: . . . v. 8, covering 1953, p. 78-88, illus., **1954**; Pennsylvania [for 1954]: . . . v. 9, covering 1954, p. 59-67, illus., **1955**; (and Lytle, William Stuckley). . . . Pennsylvania [for 1955]: . . . v. 10, covering 1955, p. 36-41, illus., **1956**.
 17. Appalachian Province, *in* Review of petroleum geology in 1945: Colorado School Mines Quart., v. 41, no. 3, p. 104-106, **1946**; . . . **1946**: . . . v. 42, no. 3, p. 152-153, **1947**; . . . 1947: . . . *ibid.*, v. 43, no. 4, p. 157-159, **1948**. A generalized, cursory review of drilling activity includes Pennsylvania. A small amount of geological data is included.
 18. (and Cathcart, Stanley Holman). The status of exploration for oil and gas in [western] Pennsylvania: Am. Petroleum Inst. Div. Production Paper 826-20-c (1), **1949** [not seen].
 19. (and Lytle, William Stuckley). Oil and gas developments in Pennsylvania in 1955: Natl. Oil Scouts and Landsmen's Assoc. Yearbook 1956, v. 26, p. 688-696, illus., **1956**.
 20. Jesse B. Miller No. 1 well, Napier Township, Bedford County: Pennsylvania Geol. Survey, 4th ser. Well-Sample Record, no. 56, 43 p., illus., **1960**. The well is 8,979 feet deep. It begins in the Devonian Shriver chert and ends in the Cambrian Bellefonte Dolomite. Sour gas was encountered at the bottom.
 21. Well-sample descriptions in northwestern Pennsylvania and adjacent states: Pennsylvania Geol. Survey, 4th ser. Bull. M 40, 691 p., illus.,

1961. Detailed lithologic logs of 40 oil wells from many parts of northwestern Pennsylvania are included. Rocks from Cambrian to Pennsylvanian age are penetrated, but most are Devonian. Cross sections are included.

FINCH, WARREN IRVIN, *see* Butler, Arthur Picree, Jr., 1.

FINN, FENTON HARRISON.

1. Memorial to Charles Reinhard Fettke (1888-1959): Geol. Soc. America Proc. 1959, p. 125-132, port., **1960.**
2. Charles Reinhard Fettke (1888-1959): Am. Assoc. Petroleum Geologists Bull., v. 45, no. 5, p. 684-688, port., **1961.**

FISCHER, RICHARD PHILIP.

1. (and Stewart, John Harris). Distribution and lithologic characteristics of sandstone beds that contain deposits of copper, vanadium, and uranium, *in* Geological Survey research 1960: U. S. Geol. Survey Prof. Paper 400B, p. B42-B44, illus., **1960.** The Devonian-aged uranium-bearing sandstones from [northeastern] Pennsylvania are cited in a table as an example of a first-cycle, stream-deposited graywacke with few actual radioactive-mineral deposits.

FISHER, DANIEL JEROME.

1. Memorial to Albert Johannsen (1871-1962): Geol. Soc. America Bull., v. 73, no. 12, p. P109-P114, port., **1962.**

FISHER, DONALD WILLIAM, *see* Barnes, Ivan Hugh, 1.

FISHER, GEORGE WESCOTT, *see* Southwick, David L., 1.

FLEISCHER, MICHAEL, *see also* Chao, Edward Ching-Tc, 1.

1. (compiler) Fluoride content of ground water in the conterminous United States (Maximum reported value for each county): U. S. Geol. Survey Misc. Geol. Invs. Map I-387, scale, 1:5,000,000, **1962.** Beaver County has the highest reported content, 1.0-1.4 ppm F. Most of the state is 0-0.4 ppm F.
2. Fluoride content of ground water in the conterminous United States, [abs.]: Geol. Soc. America Spec. Paper 90, p. 65, illus., **1967.**

FLESCHE, GERALD D.

1. (and Svec, Harry John, and Staley, H. Gene). The absolute abundance of the chromium isotopes in chromite: Geochim. et Cosmochim. Acta, v. 20, nos. 3-4, p. 300-309, illus., **1960.** Analyses of chromite from Texas, Lancaster County, is included along with 17 other ores from elsewhere. The four isotope percentages are calculated from these. No variation in the isotopic composition of the chromium in any of the samples was found within stated limits.

FLESSA, K. WALTER, *see* Bretsky, Peter William, Jr., 3; Bretsky, Sara S., 1.

FLETCHER, FRANK WILLIAM, *see also* Woodrow, Donald Lawrence, 5, 8.

1. Regional stratigraphy of Middle and Upper Devonian non-marine rocks in southeastern New York, *in* Symposium on Middle and Upper Devonian stratigraphy of Pennsylvania and adjacent states: Pennsylvania Geol. Survey, 4th ser. Bull. C 39, p. 25-41, illus., **1963**. Northeastern Pennsylvania is included. A new nomenclature standard is proposed, based upon lithologic features only. The units along the Delaware River are, from bottom to top: Hawks Nest, Oneonta, Kattel, and Walton. Erosion has removed the uppermost units.
2. Devonian mountain building and sedimentation in southeastern New York [and northeastern Pennsylvania] [abs.]: Geol. Soc. America Spec. Paper 82, p. 63, **1965**.
3. Upper Devonian correlations—northeastern Pennsylvania and southeastern New York [abs.]: Pennsylvania Acad. Sci. Proc., v. 39, no. 1, p. 22-23, **1965**.
4. (and Woodrow, Donald Lawrence). Middle and Late Devonian folding in the Appalachian Plateau of northeastern Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 115, p. 263, **1968**.

FLINT, NORMAN KEITH.

1. A new subdivision of the [Pennsylvanian] Conemaugh Group in [western] Pennsylvania [abs.]: Pennsylvania Acad. Sci. Proc., v. 36, p. 292, **1962**.
2. Stratigraphy, structure, and economic geology of southern Somerset County and adjacent parts of Bedford and Fayette Counties, Pennsylvania—Field Conf. Pennsylvania Geologists, 27th: Pittsburgh, Univ. Pittsburgh and Harrisburg, Pennsylvania Bur. Topog. and Geol. Survey, 33 p., illus., **1962**. Detailed descriptions of Silurian to Pennsylvania rocks are given; gentle folds comprise the structure. Bituminous coal is the major mineral resource, but clay, sandstone, and limestone are also present. A road log for a two day field trip, beginning near Somerset, is included. Twelve stops are described.
3. Geology and mineral resources of southern Somerset County, Pennsylvania; Pennsylvania Geol. Survey, 4th ser. Bull. C 56A, 267 p., illus. incl. geol. map, **1965**. A complete geological description of the area is given. Devonian to Pennsylvanian-aged rocks are mapped. Gentle folds are the predominant structure. Coal is the major mineral resource. Natural gas is also present, as is limestone, clay, and sandstone. The ground-water potential of the region is described.

FLIPPO, HERBERT N., JR.

1. (and Wood, Charles R.). Water-level contour maps of the carbonate rocks of the Great Valley in Lehigh County, Pennsylvania: U. S. Geol. Survey Repts. Open File, 2 sheets, **1969** [not seen].

FLOCKS, JOHN M., *see also* Faas, Richard William, 1.

FLUECKINGER, LINDA A., *see also* Beutner, Edward Chandler, 1.

1. Geology of a portion of the Allensville Quadrangle, Centre and Huntingdon Counties, Pennsylvania: MS Thesis, Pennsylvania State

Univ., 1967; Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 176, scale, 1:24,000, text, 1969. A cursory description of the area is given. Ordovician and Silurian rocks are mapped. Folds are the predominant structures, and overthrust faulting is present.

FOOSE, RICHARD MARTIN.

1. Surface subsidence and collapse caused by ground water withdrawal in carbonate rock area, in Internatl. Geol. Cong. 23d, Proc. Sec. 12, p. 155-166, illus., 1968. An example from the Hershey area, in Dauphin and Lebanon Counties is given to show the influence of the lowering of the ground-water table on surface topography and hence on engineering geological problems.
2. Mine dewatering and recharge in carbonate rocks near Hershey [Lebanon County] Pennsylvania: Geol. Soc. America Engineering Geology Case Histories, no. 7, p. 45-60, illus., 1969. The effects of ground-water withdrawal on the surrounding area (sinkholes, dry springs, etc.) are described. Litigation resulted when recharge was commenced and a quarrying operation was obliged to pump excessively. The rechargers bought the quarry.

FORNEY, GERALD GLENN.

1. (and Gealt, Dan, and Medville, Douglas). Selinsgrove Junction Caves, Northumberland County, Pennsylvania: Philadelphia Grotto Digest, v. 8, o. 4, p. 50-52, illus., 1969.

FORSYTH, JANE LOUISE, *see also* Goldthwait, Richard Parker, 1.

FOX, STEPHEN KNOWLTON, JR., *see* Johnson, Helgi, 1.

FOX, WILLIAM TEMPLETON.

1. Fortran IV program for vector trend analyses of directional data: Kansas Geol. Survey Computer Contrib. 11, 35 p., illus., 1967. An example from the crossbedding in the Pocono Formation of Pennsylvania is used to show the application of a program for determining current directions from linear, quadratic, and cubic isoazimuthal and vector trend maps. Residual maps interpret topographic highs and lows.

FRABLE, JUDITH, *see* Davis, Nevin W., 3, 4.

FRAKES, LAWRENCE AUSTIN.

1. Sedimentary structures of the Upper Devonian of central Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 35, p. 116-123, illus., 1961. Flute casts, groove casts, load casts ripple marks, convolute bedding, current lamination, animal tracks and burrows, slump structures, and current-oriented plant fragments show that turbidity currents were operating during the deposition of the Catskill Formation. Nonred units were deposited by currents flowing NNW; longshore currents toward the WSW were common. Varicolored beds were deposited by currents from the northeast.

2. Characteristics of graded bedding in the Fort Littleton Formation [central Pennsylvania]: *Pennsylvania Acad. Sci. Proc.*, v. 36, p. 208-212, illus., **1962**. Turbidity currents probably deposited the graded bedding seen only in thin section of apparently non-graded sandstone. All of the exposures are in the Juniata River valley.
3. Graded bedding in fine-grained sedimentary rocks [central Pennsylvania] [abs.]: *Geol. Soc. America Spec. Paper* 73, p. 155, **1963**.
4. Sedimentary structures of the Fort Littleton Formation in northeastern Pennsylvania, Appendix 1 in *Stratigraphy and structure of the Upper and Middle Devonian rocks in northeastern Pennsylvania—Field Conf. Pennsylvania Geologists*, 28th: Harrisburg, Pennsylvania Bur. Topog. Geol. Survey, p. 29-35, illus., **1963**. The rocks in Monroe and Pike county abound in structures such as loadcast structures, flute casts, groove casts, prod cast, and furrow casts. Graded bedding and preferred orientation of clay minerals is also to be found. The strata were probably deposited by turbidity currents in a shallow neritic environment.
5. Stratigraphy of the nonred Upper Devonian across Pennsylvania, in *Symposium on Middle and Upper Devonian stratigraphy of Pennsylvania and adjacent states*: *Pennsylvania Geol. Survey*, 4th ser. Bull. G 39, p. 183-199, **1963**. The terms Chemung, Portage, Parkhead Sandstone Member, and Losh Run Member are not usable in Pennsylvania because they can't be mapped. The Trimmers Rock Sandstone is more extensive and is recommended.
6. Paleogeography of the Trimmers Rock Member of the Fort Littleton Formation (Devonian) in southern and eastern Pennsylvania: PhD Thesis, Univ. California Los Angeles, **1964**; [abs.], *Dissert. Abs.*, v. 25, no. 6, p. 3513, **1964**.
7. Landslide facies and the paleoslope in the Catskill delta [abs.]: *Am. Assoc. Petroleum Geologists Bull.*, v. 49, no. 3, p. 340-341, **1965**.
8. Stratigraphy of the Devonian Trimmers Rock [Member of the Fort Littleton Formation] in [northeastern] Pennsylvania: *Pennsylvania Geol. Survey*, 4th ser. Bull. G 51, 208 p., illus., **1967**. Stratigraphic problems resulting from complex sedimentological processes are included. Much is made of current-formed features. Ten informal stratigraphic units are recognized.

FREDERIC, W. H., *see* Abernethy, Roy Franklin 2.

FREDERISKEN, NORMAN OLIVER.

1. Sporomorphae of the [Pennsylvanian] Brookville Seam near Brookville [Jefferson County], Pennsylvania: MS Thesis, Pennsylvania State Univ., **1961**.

FREEDMAN, JACOB L., *see also* Villaume, J. F., 1; Wise, Donald Underkoffler, 12.

1. (and Wise, Donald Underkoffler, and Bentley, Robert D.). Patterns of folded folds in the Appalachian Piedmont along Susquehanna River [Lancaster-York Counties]: *Geol. Soc. America Bull.*, v. 75, no. 7, p. 621-638, illus., **1964**; correction, no. 12, p. vii, **1964**; reprinted in *Geological investigations of the Pennsylvania Piedmont*: *Pennsylvania Geol. Survey*, 4th ser. Bull. G 46, **1964**. Three cleavages and associated

folds are analyzed and are related to 3 periods of deformation. All deformations cross the Martie Line without change. The overall style of deformation seems to change with time from predominant flow to predominant fracture, and from nappc-like flowage of sedimentary rocks to basement involvement.

2. Geology of a portion of the Mount Holly Springs Quadrangle, Adams and Cumberland Counties, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 169, 66 p., illus. incl. geol. map, **1967**. Precambrian to Cambrian metasedimentary and Triassic diabase rocks are mapped and discussed. The South Mountain Anticlinorium is the major structural feature. Clay, sand, and phyllite are the mineral resources present.
3. Bender's Quarry, Mt. Holly Springs [Cumberland County], Pennsylvania, *in* The geology of mineral deposits in south-central Pennsylvania—Field Conf. Pennsylvania Geologists, 33rd: Harrisburg, Pennsylvania Bur. Topog. and Geol. Survey, p. 28-37, illus., **1968**. The quarry, at the northern end of the Blue Ridge, is in a key position to demonstrate some of the major problems of the Blue Ridge-Piedmont region. The Antietam Quartzite is exposed in the quarry and its correlation with other quartzites of the region is discussed. The quarry area is also in the line of the Kelvin-Cornwall fault, and splays of it may be present as the faults in the quarry area. Sand from the leaching of cementing silica on the fault planes is being quarried. Specific features in the quarry are alluded to as parts of the larger problems. Some thrusting is present also.
4. Geochemical prospecting for zinc, lead, copper, and silver, Lancaster Valley, southeastern Pennsylvania: U. S. Geol. Survey Repts. Open File, 5 p., illus., **1968**. A brief description of the occurrence of these elements near the Bamford, Pequana, and Gap mines is given. Anomalous patterns are shown in the soils, rocks, and stream sediments.
5. Northeast-plunging folds and high-angle faulting near the northeast end of the Blue Ridge Mountains [Adams and Cumberland Counties] Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 101, p. 258-259, **1968**.
6. Controls of Pb, Zn, Ag ore solutions, Piedmont, southeastern Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 121, p. 103, **1969**.
7. Geochemical prospecting investigations in the Lancaster Valley, Piedmont of southeastern Pennsylvania [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 1, p. 20, **1969**.

FRIDLEY, HARRY MARION.

1. Sidney Longman Galpin (1886-1962): Am. Assoc. Petroleum Geologists Bull., v. 47, no. 5, p. 871-872, port., **1963**.
2. (and Eddy, Gregory E.). Divide shifting between the Ohio and Monongahela Rivers [southwestern Pennsylvania]: West Virginia Acad. Sci. Proc. 1964, v. 36, p. 152-153, illus., **1964**. The divide between the two rivers is shifting eastward as a result of the increased gradient of the streams west of the divide having been caused by Pleistocene drainage changes.

FRIEDEL, ROBERT AUGUSTINE *see* Lefellhocz, John F., 1; Retcofsky, H.L., 1, 2, 3.

FRIEDMAN, GERALD MANFRED.

1. (and Johnson, Kenneth George). The Devonian Catskill delta complex of New York [and northeastern Pennsylvania], type example of a "tectonic delta complex", in *Deltas in their geologic framework*: Houston, Texas, Houston Geol. Soc., p. 171-188, illus., **1966**. A tectonic delta complex is proposed for a delta built into a marine basin contiguous to an active mountain front and dominated by orogenic sandstones. Numerous examples are taken from exposures in the state.

FRIEDRICH, JOHN T.

1. Conodoguinet Cave [Cumberland County]: Shippensburg Grotto Newsletter, v. 2, no. 8, p. 68-69, illus., **1967**.

FRIEND, PETER FURNEAUX, *see* Allen, J. R. L., 1.

FRYXELL, FRITIOF MELVIN.

1. Albert Charles Peale [1849-1914]—Pioneer geologist of the Hayden Survey: *Annals of Wyoming*, v. 34, no. 2, p. 175-192, port., illus., **1962**.

FULLAGAR, PAUL DAVID.

1. (and Bottino, Michael Louis). Rubidium-strontium age study of Middle Devonian Tioga Bentonite: *Southeastern Geology*, v. 10, no. 4, p. 247-256, illus., **1969**. The Tioga Bentonite, from 22 locations, including many in Pennsylvania, is dated. All are altered. Fifteen of the 22 lie on the 310 m.y. isochron, and the average "age" is 302 m.y., about 70-80 m.y. (20%) younger than expected, thereby demonstrating that the use of weathered material is feasible.

FURNISH, WILLIAM MADISON.

1. (and Glenister, Brian Frederick, and Hansman, Robert Herbert). Brachycycloceratidae, *novum*, deciduous Pennsylvanian nautiloids: *Jour. Paleontology*, v. 36, no. 6, p. 1341-1356, illus., **1962**. *Brachycyloceras normale* is reported from the Pine Creek Limestone (Conemaugh) at Undercliff, Allegheny County.
2. Memorial to Arthur K[ith] Miller (1902-1963): *Jour. Paleontology*, v. 37, no. 4, p. 944-946, port., **1963**.

GABELMAN, JOHN WARREN.

1. Metallogenic zoning in the North American Appalachian region: *Internatl. Geol. Cong. 23rd, Proc. Sec. 7*, p. 17-33, illus., **1968**. Small-scale maps show metal distribution, and paragenetic iso-ranges with their relations to approximate positions of tectonic mobile belts and deformation zones of the compressive phase. Included also is a map of taphrogenic features. There is a good correlation of mineralization with tectonism.
2. Uranium in the Appalachian mobile belt [abs.]: *Geol. Soc. America Spec. Paper 121*, p. 437-438, **1969**.

GALEY, JOHN TAYLOR.

1. Oil and gas development in southwestern Pennsylvania during 1944: Am. Inst. Mining and Metallurgical Engineers Trans., v. 160, p. 477-480, illus., **1945**.

GALLEY, JOHN E.

1. (and others) Radioactive-waste disposal potentials in selected geologic basins—a reconnaissance study: U. S. Atomic Energy Commission, Rept. SAN-413-2, 31 p., illus., **1964**. The Dunning Cove Syncline, in Bedford County, is selected as a typical example of the nature of the rocks in the Valley and Ridge Province. Because of the lithology, structure, and other considerations, this syncline would make a good disposal reservoir.

GARD, THEODORE M., *see* Beutner, Edward Chandler 1.

GARDNER, FRANK JOHNSON.

1. Pennsylvania gas hunters look toward the east [Blair and York Counties]: Oil and Gas Jour., v. 59, no. 8, p. 193, illus., **1961**. Descriptions of gas-producing structures in Blair County, where gas is in the Oriskany Sandstone, leads to speculation about the geology of York County where a well is being drilled through the Triassic rocks with a view toward entering Palozoic rocks at about 7,000 feet.

GARDNER, LEONARD ROBERT.

1. The Pleistocene geology of the Brodheadsville and Pohopoco Mountain (7.5') Quadrangles [Carbon and Monroe Counties]: Pennsylvania: MS Thesis, Pennsylvania State Univ., **1966**.

GATES, CAMERON HERSCHEL.

1. Origin and development of flow cleavage in the [Ordovician] Martinsburg Formation, Lehigh and Northampton Counties, Pennsylvania: MA Thesis, Univ. Texas, **1962**.

GAULT, HUGH RICHARD, 1915-1961, *see* Ray, Satyalirata, 1.

GEALT, DAN, *see* Forney, Gerald Glenn, 1.

GEDDE, ROGER WALTER.

1. Geophysical investigation of a magnetite deposit, Chester County, Pennsylvania: MS Thesis, Pennsylvania State Univ., **1965**.

GEDDES, WILBURT, *see* Zietz, Isidore, 2.

GEHLBACH, FREDERICK RENNER.

1. Amphibians and reptiles from the Pliocene and Pleistocene of North America—A chronological summary and selected bibliography: Texas Jour. Sci., v. 17, no. 1, p. 56-70, illus., **1965**. Herptofauna from the Port Kennedy Cave in Montgomery County and the Frankstown Cave in Blair County are included. The former is Yarmouthian and the latter Wisconsinan or post-glacial. The data are tabulated.

GEHRIS, CLARENCE WINFRED.

1. Pollen analysis of the [Quaternary] Cranberry Bog Preserve, Tannersville, Monroe County, Pennsylvania: PhD Thesis, Pennsylvania State Univ., **1964**; [abs.], Dissert. Abs., v. 25, no. 8, p. 4372, **1965**.

GEOLOGICAL SOCIETY OF AMERICA.

1. Carl Huntington Broedel [1908-1959]: Geol. Soc. America Proc. 1959, p. 169, **1960**.

GEORGE, JOHN R., *see* McCarren, Edward F., 1; Williams, Kenneth F., 1.

GERAGHTY, JAMES JOSEPH, *see* Miller, David William, 1.

GETTEL, L., *see* Gettell, Phillip E. A., 5.

GETTEL, PHILLIP, E. A.

1. (and Miller, Charles). Cleversburg Sink [Cave, Cumberland county]: York Grotto Newsletter, v. 5, no. 7, p. 90-92, illus., **1964**.
2. (and Herbein, Jay T.) [Map of] Grueber's Sink [Cave, Cumberland County]: York Grotto Newsletter, v. 6, no. 2, p. 24, **1964**.
3. (and Herbein, Jay T.) Hummelstown Shelter Cave, Dauphin County: York Grotto Newsletter, v. 6, no. 12, p. 148, illus., **1965**.
4. (and Brison, David N., and Herbein, Jay T.). [Map of] Hummelstown Quarry Cave, Dauphin County: Speleo Digest 1964, p. 113, **1966**.
5. (and Gettel, L., and Speece, Jack H.) [Map of] Cline's Sink Cave, Fulton County, Pa.: York Grotto Newsletter, v. 9, no. 6, p. 72, illus., **1968**.

GEYER, ALAN RAYMOND, *see also* Lapham, Davis Mortimer, 4, 12.

1. (and Buckwalter, Tracy Vere, Jr., and McLaughlin, Dean Benjamin, and Gray, Carlyle). Geology and mineral resources of the Womelsdorf Quadrangle [Lancaster, Lebanon, and Berks Counties]: Pennsylvania Geol. Survey, 4th ser. Atlas A 177c [Bull. A 177c], 96 p., illus. incl. geol. map, **1963**. A complete geological description of the area is given. Precambrian-Ordovician, and Triassic rocks are mapped. Folds and faults are the primary structures. Mica, high calcium limestone, and ground water are the main mineral resources.
2. Hickory Run State Park—boulder field [Carbon County]: Pennsylvania Geol. Survey, 4th ser. State Park Guide 2, 1 sheet, text, [**1969**]. This is a popular account of the origin of the boulder field. It formed by the extreme periglacial erosion of the sandstone ridges in the region, the product accumulating in the valley of Hickory Run.

GEYL, W. F.

1. Morphometric analysis and the world-wide occurrence of stepped erosion surfaces: Jour. Geology, v. 69, no. 4, p. 388-416, illus., **1961**. The convex break of slope between the flatter part of one erosion surface and the marginal slope of the next lower surface is the main criterion

for recognition, on contoured maps, of erosion surfaces. Examples are taken from the Sunbury, Shamokin, Catawissa, Harrisburg, Middletown, McCalls Ferry, Burlington, Germantown, Chester, and Renovo Quadrangles.

GHAFFAR-ADLEY, RHAMAT, *see also* Crowe, Christopher, 1.

1. A detailed gravity survey in the Triassic basin, north Chester County: MS Thesis, Pennsylvania State Univ., **1961**.

GIBBONS, JOHN R., *see also* Schlossman, S., 1.

1. Residual stresses in spheroidally weathered boulders [southeastern Pennsylvania] [abs.]: Geol. Soc. America Abstracts With Programs 1969, pt. 7, p. 77, **1969**.

GIBSON, FRANCIS HAROLD, *see also* Abernethy, Roy Franklin, 1, 2; Selvig, Walter Alfred, 1.

1. (and Selvig Walter Alfred). Rare and uncommon chemical elements in coal: U. S. Bur. Mines Tech. Paper 669, 23 p., illus., **1944**. Eighteen elements are discussed as regards to their origin and occurrence in coal. Some are known from various coals from various places in western Pennsylvania.

GILBERT, FRANCIS PAUL, *see* Henderson, John Richard, Sr., 1.

GILDERSLEEVE, BENJAMIN.

1. Magnesite and brucite in the United States, exclusive of Alaska and Hawaii: U. S. Geol. Survey Mineral Invs. Resource Map MR-27, scale, 1:3,168,000, separate text, **1962**. Such materials are noted at the Wood and Goat Hill chromite deposits in Lancaster County.

GILL, HAROLD EDWARD.

1. (and Walker, John, and Brown, Philip Monroe). Hydrologic significance of the configuration of the pre-Cretaceous basement of the Atlantic Coastal Plain—New Jersey, [southeastern] Pennsylvania, and Delaware [abs.]: Geol. Soc. America Spec. Paper 115, p. 265-266, **1968**.

GILLESPIE, WILLIAM HARRY, *see* Clendening, John A., 2.

GILLULY, JAMES.

1. Memorial to Parker Davies Trask (1899-1961): Geol. Soc. America Bull., v. 74, no. 1, p. P13-P19, port., **1963**.

GILLSON, JOSEPH LINCOLN, *see* American Institute of Mining, Metallurgical, and Petroleum Engineers, 1.

GILPIN, JOSHUA.

1. Journal of a tour from Philadelphia thro[ugh] the western counties of Pennsylvania in the months of September and October, 1809: *Pennsylvania Mag. History and Biography*, v. 50, p. 64-77, 163-178, 380-382, illus., **1926**; v. 51, p. 172-190, 351-375, **1927**; v. 52, p. 29-58, illus., **1928**. Numerous geological observations about western Pennsylvania are included. Most are very astute.

GLAESER, JOHN DOUGLAS.

1. Petrology of the basal Stockton [Triassic] lithofacies of eastern Montgomery County, Pennsylvania: MS Thesis, Miami Univ., **1958**.
2. Catskill reference section [Carbon County] and its correlation to other measured surface sections in northeast Pennsylvania, in *Symposium on Middle and Upper Devonian stratigraphy of Pennsylvania and adjacent states*: *Pennsylvania Geol. Survey*, 4th ser. Bull. G 39, p. 51-62, illus., **1963**. A reference section in Lehigh Gap is proposed, and fifteen informal members are recognized. Correlations of these with those of nearby areas are made, and show interfingering of sandstone with red siltstones and shales in the lowermost unit.
3. Lithostratigraphic nomenclature of the Triassic Newark-Gettysburg Basin: *Pennsylvania Acad. Sci. Proc.*, v. 37, p. 179-188, illus., **1963**. The Hammer Creek Formation is proposed for the clastic rocks; it is geographically between the Brunswick Formation to the east the Gettysburg Formation to the west. It is the unit composed of the inter-tonguing of these two and is typical of neither, hence the new name.
4. Stratigraphy and structure of Upper and Middle Devonian rocks in northeastern Pennsylvania—Field Conf. *Pennsylvania Geologists*, 28th: Harrisburg, *Pennsylvania Bur. Topog. and Geol. Survey*, 44 p., illus., **1963**. A generalized discussion of Devonian rocks and structures is followed by a road log for a two-day field trip. Both days begin and end in Stroudsburg, and eleven stops are made. Brief descriptions of each of the stops, and numerous illustrations are included.
5. Provenance, dispersal, and depositional environments of Triassic sediments in the Newark-Gettysburg Basin [southeastern]: Ph D Thesis, Northwestern Univ., **1964**; *Dissert. Abs.*, v. 25, no. 7, p. 4079-4080, **1965**; *Pennsylvania Geol. Survey*, 4th ser. Bull. G 43, 169 p., illus. incl. geol. maps, **1966**. The mineralogy, texture, and color of sediments are evaluated petrographically to determine the nature of the basin and provenance of the sediments. Numerous types of sedimentation and sources are present, and much of the data is on maps.
6. Sediment dispersal interpreted from composition and texture distributions in the Triassic Newark-Gettysburg Basin [southeastern Pennsylvania] [abs.]: *Geol. Soc. America Spec. Paper* 82, p. 73, **1965**.
7. Bedding-plane slips, wedge faulting, and facies changes in the Parryville syncline, Carbon County, Pennsylvania: *Pennsylvania Acad. Sci. Proc.*, v. 40, no. 2, p. 95-98, illus., **1967**. Internal structural and stratigraphic complexities in the Devonian Catskill Formation are described. Both pre-fold sliding and compressional movements affected

the rocks. The exposure is nearly 4,000 feet long along the Lehigh River.

8. [Devonian] Catskill stratigraphy at Lehigh Gap [Carbon County] and its relationship to type locations in northeastern Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 115, p. 266, **1968**.
9. Absence of Pocono Formation at Elk Mountain, Susquehanna County, Pennsylvania: Pennsylvania Acad. Sci. Proc. 1968, v. 42, p. 187-189, illus., **1969**. Detailed measured sections west of the Lackawanna syncline show the entire ridge to be underlain by Catskill Formation and not Pocono as shown on the state geologic map.
10. Geology of the flagstones in the Endless Mountains region, northern Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 66, 14 p., illus., **1969**. The physical properties, regional distribution, occurrence, and origin of flagstones [Devonian] are presented. Emphasis upon their economic recovery is made also. They occur extensively in the Tioga, Bradford, Susquehanna, Sullivan, and Wyoming Counties.
11. Marginal marine deposits in Upper Devonian Catskill Formation, northeast Pennsylvania [abs.]: Pennsylvania Acad. Sci. Proc., v. 42, p. 14, **1969**.

GLENISTER, BRIAN FREDERICK, *see* Furnish, William Madison, 1.

GLICK, ERNEST EARWOOD, *see* Kchn, Thomas Mathew, 2.

GOLD, DAVID PERCY, *see* Deines, Peter, 2.

GOLDSTEIN, JOSEPH I.

1. The classification of iron meteorites, *in* Meteorite research: New York, Springer-Verlag, p. 721-737, illus., **1969**. A classification based on cooling rate and Ga-Ge groups is proposed. Mount Joy [Adams County] and New Baltimore [Somerset County] are included together in the same group.

GOLDTHWAIT, RICHARD PARKER.

1. (and Dreimanis, Aleksis, and Forsyth, Jane Louise, and Karrow, Paul F., and White, George Willard). Pleistocene deposits of the Erie Lobe, *in* The Quaternary of the United States: Princeton, New Jersey, Princeton Univ. Press, p. 85-97, illus., **1965**. A summary of the Pleistocene glacial deposits of northwestern Pennsylvania is included. Illinoian and "late" Wisconsin drift are present. Moraines and kame terraces are common, and outwash and lake sediments are also present.

GOODLETT, JOHN CAMPBELL, *see* Denny, Charles Storrow, 2.

GOODSPEED, FRANCES E., *see* King, Lewis H., 1.

GOODWIN, BRUCE KESSELI.

1. Structural behavior of the Lima Granite, southwest of Media, [Delaware County] Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 35, p. 137-141, illus., **1961**. Xenoliths of gabbro and serpentine, and dissimilarity of joints in the granite and country rock suggest the granite is a synkinematic, intrusive, igneous pluton.
2. Structural control of Wissahickon Creek in Philadelphia, [Philadelphia County] Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 37, p. 304-308, illus., **1963**. The path of the creek is determined in part by lithology and by joint sets in the Wissahickon Schist. The stream follows joint sets in competent rocks and follows bedding in incompetent—rock terrane.
3. Guidebook to the geology of the Philadelphia area: Pennsylvania Geol. Survey, 4th ser. Bull. G 41, 189 p., illus., **1964**. This is a popular summary of general geology principles followed by descriptions of areas in and around Philadelphia. Road logs for specific guided tours are included.

GORDON, ROBERT BOYD.

1. A note on the weathering of serpentinite found in southeastern Pennsylvania: Pennsylvania Acad. Sci. Newsletter, v. 27, no. 1, p. 1, **1969**. Large, loose specimens coated with limonite occur as honey-combed or pitted massive fragments. Structure and location suggest they are alteration products of serpentinite, weathered beyond recognition.

GORMAN, JOSEPH MICHAEL, 1910-1967.

1. Shafer Run Cave [Somerset County]: Netherworld News, v. 11, no. 12, p. 207-209, illus., **1963**; originally published 1939.

GOTH, JOSEPH HERMAN, JR., *see also* Lytle, William Stuckley, 17.

1. Dry Ridge Pool [Westmoreland County], in Oil and gas developments in Pennsylvania in 1965: Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 172, p. 30-31, illus., **1966**. The pool produces gas from an anticline in the Onondaga Chert and Oriskany Sandstone. Two high-angle reverse faults pass through the structure parallel to the axis.

COTTFRIED, DAVID.

1. (and Greenland, L. Paul, and Campbell, Esma Y.). Variations of Nb-Ta, Zr-Hf, Th-U, and K-Cs in two diabase-granophyre suites [York County]: Geochim. et Cosmochim. Acta, v. 32, no. 9, p. 925-947, illus., **1968**. The sill at Dillsburg is one of the two bodies studied. The variations in these elements and their ratios in the different cooling phases are detected. When these are compared with oceanic tholeiites, crustal contamination does not entirely account for the differences.
2. (and Rowe, Jack James, and Tilling, Robert Ingersoll). Geochemical behavior of gold during magmatic differentiation: Geol. Soc. America Abstracts with Programs 1969, pt. 7, p. 277-278, illus., **1969**. Diabase-granophyre from York County is analyzed along with many other rocks from many other places to show that gold is not concentrated in residual liquids during differentiation.

GRAHAM, JACK BENNETT.

1. Occurrence of ground water in the Triassic area of [southeastern] Pennsylvania as influenced by geology: Pennsylvania Water Works Operators Assoc. Jour., v. 17, p. 86-98, illus., **1945**. This is a semi-popular account of this occurrence of ground water and its influence by geological controls imposed by Triassic rocks.
2. (and Kammerer, John Craig). Ground-water resources of the U. S. Naval Base, Philadelphia [Philadelphia County] Pennsylvania: U. S. Geol. Survey Repts. Open File, **1951** [not seen].
3. Availability and use of ground water in Delaware River Basin: Am. Water Works Assoc. Jour., v. 54, no. 6, p. 684-694, illus., **1962**. This is a very general summary of the origin of the water in the river basin. A general geological background of southeastern Pennsylvania in the vicinity of the river is included.

GRAUCH, RICHARD I., *see* Wise, Donald Underkoffler, 11.

GRAUSTEIN, JEANNETTE E.

1. The eminent Benjamin Smith Barton [1766-1815]: Pennsylvania Mag. History and Biography, v. 85, p. 432-438, **1961**.

GRAY, CARLYLE, *see also* Geyer, Alan Raymond, 1; Zeitz, Isidore, 1.

1. (and others). Geologic map of Pennsylvania: Pennsylvania Geol. Survey, 4th ser., scale, 1:25,000, **1960**.
2. (and Wise, Donald Underkoffler). Nappe structures and the Annville quarry [Lebanon County], in Some tectonic and structural problems of the Appalachian Piedmont along the Susquehanna River—Field Conf. Pennsylvania Geologists, 25th: Lancaster, Franklin and Marshall College, p. 89-91, illus., **1960**. A small-scale geologic map of the area demonstrates the presence of nappes in the region. Overturned, thrust-faulted folds are evident, and specific details are pointed out; evidence to the south of the Triassic belt in Lancaster County is also noted.
3. (and Lapham, Davis Mortimer). Guide to the geology of Cornwall, [Lebanon County] Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. G 35, 18 p., illus. incl. geol. map, **1961**. A general description of the ore deposit is given. It is intended for the use of geologists and mineral collectors visiting the area.
4. (and Socolow, Arthur Abraham). A metasedimentary specularite deposit in the Harpers Formation of [York County] Pennsylvania [abs.]: Econ. Geology, v. 56, no. 7, p. 1339, **1961**.

GRAY, LEWIS RICHARD.

1. Palynology of four Allegheny coals, northern Appalachian coal field [western Pennsylvania]: Ph D Thesis, Univ. Illinois, **1965**; [abs.], Dissert. Abs., v. 26, no. 5, 2433-2444, **1965**; Paleontographica, ser. B, v. 121, nos. 1-3, p. 65-86, illus., **1967**. Spores from the two Kittanning coals from the type sections are described and illustrated. The small-spore populations are uniform in composition and relative abundance.

GRAY, RALPH JOSEPH.

1. (and Schapiro, Norman, and Coe, Glen Dale). Distribution and forms of surfur in a high volatile Pittsburgh seam coal: *Am. Inst. Mining, Metallurgical, and Petroleum Engineers Trans.* 1963, v. 226, no. 2, p. 113-121, illus., **1963**. Sulfur in coal from western Pennsylvania occurs as 57% pyrite, and the remainder occurs as organic sulfur. The total S content of the coal is 2.4%.

GREEN, WILLIAM DELAP, *see* Fanale, Fraser Partington, 2.

GREENE, GORDON WILLIAM, *see also* Moxham, Robert Morgan, 1.

1. (and Moxham, Robert Morgan, and Harvey, Arnold H.). Aerial infrared surveys and borehole temperature measurements of coal mine fires in Pennsylvania, *in* Proceedings of the 6th International conference on remote sensing of environment, 1969: Ann Arbor, Michigan Univ. Willow Run Labs., p. 517-525, illus., **1969**. Fires at shallow depths (<10 m) were easily detected. Those between 10 and 30 m were detected if cracks were present or if fires were very old. Below 30 m they were detected only if cracks existed. Borehole studies were made to study heat flow.

GREENE, JOHN COLTON.

The development of mineralogy in Philadelphia, 1780-1820: *Am. Philos. Soc. Proc.*, v. 113, no. 4, p. 283-295, **1969**; summary *in* Toward a history of geology—New Hampshire inter-disciplinary conference on the history of geology, 1967: Cambridge, Mass. Inst. Technology Press, p. 184-185, **1969**. This is a popular account of mineralogy in the early United States. The relations of the early physicians, chemists, and mineralogists to the American Philosophical Society and the Academy of Natural Sciences is stressed.

GREENE COUNTY [PENNSYLVANIA] PLANNING COMMISSION.

1. The economy . . . : Waynesburg, Pennsylvania, Greene County Planning Commission, 141 p., **1958**. A general review of the geology and mineral sources of the county is included in an otherwise general report on the economy of the county.

GREENLAND, L. PAUL, *see* Gottfried, David, 1.

GREENMAN, DAVID WOLCOTT.

1. (and Rima, Donald Robert, and Lockwood, William Noble, and Meisler, Harold). Ground-water resources of the Coastal Plain area of southeastern Pennsylvania with special reference to the effects of human activities on the quality of water in the Coastal Plain sediments: *Pennsylvania Geol. Survey, 4th ser. Bull. W* 13, 375 p., illus., **1961**. Parts of Delaware, Philadelphia, and Bucks Counties are included. Only the Cretaceous Raritan Formation and Recent alluvial deposits are present.

Their distribution and water-bearing properties are discussed. Contamination from urban development is an important influence on the otherwise abundant supplies of ground water. Analyses are included.

GREGORY, JOSEPH TRACY, *see also* Colbert, Edwin Harris, 1.

1. The genera of phytosaurs: *Am. Jour. Sci.*, v. 260, no. 9, p. 652-690, illus., **1962**. The family is revised, and some specimens from the Triassic of southeastern Pennsylvania are included in the genus *Phytosaurus*.
2. The relationships of the American phytosaur *Rutiodon*: *Am. Mus. Novitates*, no. 2095, 22 p., illus., **1962**. Fragments of *Rutiodon carolinensis* from Triassic rocks in York County may belong to the genus *Clepsysaurus*.

GREGORY, WILLIAM KING.

1. Present status of the problem of the origin of the Tetrapoda with special reference to the skull and paired limbs: *New York Acad. Sci. Annals*, v. 26, p. 317-383, illus., **1915**. *Sauripterus taylori* Hall from the Devonian Catskill rocks near Blossburg, Tioga County, is described in great detail, and illustrated for the first time. Its role in the evolution of tetrapod limbs from rhipidistid fish is emphasized.

GRIESS, PHYLLIS RICE, *see* Deasy, George F., 1, 2, 4, 5.

GRIFFIN, JAMES BENNETT, *see* Crane, Horace Richard, 1, 2.

GRIFFITHS, D. H., *see* Opdyke, Neil D., 1.

GRIFFITHS, H. H., *see* Brady, George A., 1.

GRIFFITHS, JOHN CEDRIC, *see also* Emery, John Rathbone, 2; Modaressi-Ghavanji, Hassan, 2; Shadle, H. W., 1; Williams, Eugene Griffin, 3; Wood, George Vincent, 3.

1. Frequency distributions in accessory mineral analysis [Centre County]: *Jour. Geology*, v. 68, no. 4, p. 353-365, illus., **1960**. Zircon from the Oswego Sandstone in Centre County were evaluated, using several samples and samplers. The resulting data did not fit any of the possible models and a non-random variation among operator-sample pairs is cited as the cause.
2. Relationships between reservoir petrography and reservoir behavior of some Appalachian oil sands, in *Symposium on geology and secondary recovery*: *Tulsa Geol. Soc. Digest*, v. 28, p. 43-58, illus., **1960**. Data from numerous sandstone formations in Pennsylvania are used to show that quantitative analysis of reservoir rocks in terms of their behavioral characteristics and petrography are important in understanding why reservoir rocks behave as they do.
3. Frequency distributions of some natural resource materials, in *Twenty-third technical conference on petroleum production, 1962*: *Pennsylvania State Univ. Mineral Industries Exper. Sta. Circ.* 63, p. 174-198, illus.,

[1963?]. The frequency distribution of oil and gas fields in Pennsylvania is used as an example of using a constant probability model as an initial base for comparison. Potentially favorable areas can be detected.

4. An algorithmic program for the analysis of detrital reservoir rocks [abs.]: Am. Assoc. Petroleum Geologists Bull., v. 48, no. 4, 517-528, **1964**.
5. Statistical approach to the study of potential oil reservoir sandstones, in Computers in the mineral industry, Part 2: Stanford Univ. Pub. Geol. Sci., v. 9, no. 2, p. 637-668, illus., **1964**. Examples of petrographic analysis of the barren Pocono Sandstone in Pennsylvania are compared with oil-bearing rocks from elsewhere to show that subtle differences in petrography can be detected by statistical techniques, and hence potential target and non-target areas can be recognized. Various parameters are compared to determine which are the critical ones.
6. A genetic model for the interpretive petrology of detrital sediments: Jour. Geology, v. 74, no. 5, pt. 2, p. 655-672, illus., **1966**. A number of examples, many from Pennsylvania, illustrate that variation in the properties of detrital sediments, measured in thin sections, contains much redundant information. The most obvious features which emerge are related to variation in size, sorting, and cement constituents. No new properties need be measured unless additional information is sought.
7. (and Ondrick, Charles William). Sampling a geological population: Kansas Geol. Survey Computer Contrib. 30, 53 p., illus., **1968**. Pebbles from the Montoursville Gravel [Lycoming County?] are used as an example of showing how one can achieve satisfactorily unbiased "best estimators" of the population. A combination of channel and unstratified sampling is required.

GRIFFITTS, WALLACE RUSH.

1. (and Larrabee, David Marcel, and Norton, James Jennings). Beryllium in the United States, exclusive of Alaska and Hawaii: U. S. Geological Survey Mineral Invs. Resource Map MR 35, scale, 1:3,168,000, separate text, **1962**. Numerous occurrences of beryllium in southeastern Pennsylvania, and one occurrence in Lebanon County, are shown on a map. All are small. No details are included.

GRISCOM, ANDREW, *see also* Bromery, Randolph Wilson, 61.

1. Tectonic significance of the Bouguer gravity field of the Appalachian system [abs.]: Geol. Soc. America Spec. Paper 73, p. 163-164, **1963**.
2. (and Zeitz, Isidore). Differences between aeromagnetic and geologic depths to basement in the Appalachian Plateau [abs.]: Geol. Soc. America Spec. Paper 76, p. 68-69, **1964**.

GROSHONG, RICHARD H.

1. Systematic joints across a syncline in the Valley and Ridge Province [central Pennsylvania] [abs.]: Pennsylvania Acad. Sci. Proc., v. 39, no. 1, p. 23, **1965**.

GROSS, DAVID L., *see also* White, George Willard, 4.

1. (and Moran, Stephen R.). Textural and mineralogical gradations within tills of the Allegheny Plateau [northwestern Pennsylvania] [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 6, p. 18-19, **1969**.

GROSS, GERARDO WOLFGANG.

1. Location of clay deposits [Blair County] by combined self-potential and resistivity surveys: Am. Inst. Mining, Metallurgical, and Petroleum Engineers Trans. 1960, v. 217, p. 124-130, illus., **1961**. A commercial kaolin deposit contained in the overburden of the Cambrian Gatesburg Formation is successfully mapped by SP and resistivity methods. The success of the test supports the theory that the technique may be useful elsewhere.

GROSS, WALTER.

1. Friedrich Freiherr von Huene 22.3.1875-4.4 1969: Palaeontol. Zeitschr. v. 43, nos. 3-4, p. 111-112, **1969**.

GROTH, LINDA N. W.

1. Late-glacial and post-glacial vegetational changes in the Conneaut Marsh region [Crawford County] northwestern Pennsylvania: MS Thesis, Pennsylvania State Univ., **1966**.

GROTH, PETER KLAUS HELMUTE, *see also* Habib, Daniel, 3.

1. Palynological delineation of environment in the [Pennsylvanian] Columbian Shale of western Pennsylvania: MS Thesis, Pennsylvania State Univ., **1966**.

GROW, GEORGE COPERNICUS, JR.

1. Gas production near hard coal areas of [northeastern] Pennsylvania: World Oil, v. 159, no. 4, p. 79-81, illus., **1964**. The occurrence of gas in the Harvey Lake field in Lackawanna County is described. The gas in sandstone stringers in the Chemung Formation. It comes from a dome on the White Deer anticline.

GRUNAU, JOHN CHARLES.

1. Search for Red Medina gas sparked by Brooky [Crawford County] hit: Oil and Gas Jour., v. 59, no. 20, p. 218-220, illus., **1961**. This is a general description of the occurrence of gas in the Silurian Medina Sandstone. It appears to be in a stratigraphic trap. Deeper, older rocks may also contain hydrocarbons.
2. NW Pennsylvania, SW New York promise success to drillers: Oil and Gas Jour., v. 60, no. 14, p. 204-208, illus., port., **1962**. A general survey of the area stresses the deeper possibilities (Ordovician and Silurian) which exist. The Silurian Medina Formation is a big producer, and its geological position is described.

GUBER, ALBERT LEE, *see* Williams, Eugene Griffin, 6, 9.

GUILD, PHILIP WHITE, *see* Carr, Martha Ensign Strait 1.

GUILDAY, JOHN E., *see also* Hibbard, Claude William, 1; McCrady, Allen D., 2.

1. (and Bender, Martin S.). Late Pleistocene records of the yellow-cheeked vole, *Microtus xanthognathus* (Leach): Carnegie Mus. Annals, v. 35, art. 14, p. 315-330, illus., 1960. The specimen is reported from New Paris sink no. 4 in Bedford County. Extensive discussion, description, and illustration of the material, mostly teeth, is included. Many measurements are tabulated.
2. On microtines and men: Netherworld News, v. 8, no. 8, p. 127-129, 1960; Speleo Digest 1960, p. II 116-II 118, 1962. A popular summary of voles in the Recent and Pleistocene include examples from caves in central Pennsylvania.
3. Cleaning and cataloguing of fossil material from New Paris [Bedford County], (Pa.): Speleo Digest 1959, p. II 129-II 131, 1961. This is a semi popular account of the procedure for identifying animals and evaluating climates from cave material.
4. (and Doult, J. Kenneth). The collared lemming (*Dicrostonyx*) from the Pennsylvania Pleistocene: Biol. Soc. Washington Proc., v. 74, p. 249-250, 1961. *Dicrostonyx hudsonius* from the New Paris Cave in Bedford County is the first unequivocal tundra rodent from the Appalachian Mountain region.
5. The pterosaur and the lemming: Netherworld News, v. 9, no. 8, p. 142-144, 1961; summary titled, The lemming, New Paris: Speleo Digest 1961, p. II 72-II 73, 1963. A semi popular account of the occurrence of a lemming in the New Paris Cave, Bedford County, is given.
6. The comings and goings of squirrels: Netherworld News, v. 10, no. 4, p. 67-70, 1962; Speleo Digest 1962, p. II 36-II 39, 1964. This is a semi popular account of the occurrence of Pleistocene ground squirrels, chipmunks, and flying squirrels in caves. New Paris Cave in Bedford County is cited as a source.
7. (and McCrady, Allen D.). The Clarksville [Mercer County] deer—A case history: Am. Antiquity, v. 29, no. 1, p. 109-111, illus., 1963. Radiocarbon dates on a deer skeleton in reworked Pleistocene valley outwash from Pymatuning Creek show it to be 1150 ± 100 years BP and hence post-glacial in age.
8. Martin S. Bender, 1903-1962: Soc. Vertebrate Paleontology News Bull. 67, p. 48, 1963.
9. Pleistocene zoogeography of the lemming, *Dicrostonyx*: Evolution, v. 17, no. 2, p. 194-197, illus., 1963. Lemmings, *Misothermus*, from the New Paris sinkhole no. 4 in Bedford County support the hypothesis that the present lemming *D. hudsonius* stock was developing at the time of the maximum Wisconsin glaciation and is not a product of speciation caused by the intervention of Hudson Bay as the ice retreated.
10. (and Martin, Paul Schultz, and McCrady, Allen D.). New Paris no. 4—a late Pleistocene cave deposit in Bedford County, Pennsylvania: Natl. Speleol. Soc. Bull., v. 26, no. 4, p. 121-194, illus., 1964. A late Pleistocene biota is described. Over 2,400 vertebrates and accompanying pollen

spectra are present. The radiocarbon date is about 11,300 years BP. A cool taiga parkland is indicated.

11. The Ice Age heffalump trap [Bedford County]: Canadian Audubon, v. 27, no. 4, p. 110-114, illus., **1965**. This is a popular account of the New Paris, Bedford County, sinkhole from which much Pleistocene bone material has been recovered. Much is made of the climatic interpretations based on pollen analyses.
12. (and Hamilton, Harold W., and McCrady, Allen D.). The bone breccia of Bootlegger Sink, York County, Pennsylvania: Carnegie Mus. Annals, v. 38, p. 145-163, illus., **1966**. Bones in matrix fill an inactive sinkhole. Three invertebrate species are listed. There are also 6 Amphibia species, 7 reptiles, and 40 mammals. Brief annotations of each are included. They are, in part, Pleistocene.
13. The climatic significance of the Hosterman's Pit local fauna, Centre County, Pennsylvania: Am. Antiquity, v. 32, no. 2, p. 231-232, illus., **1967**. The change from a boreal to a temperate mammal fauna in central Pennsylvania is believed bracketed by radiocarbon dates associated with two cave faunas at from *ca* 9,300 to 7,290 B.C.
14. On the Pleistocene Big Brown Bat [*Eptesicus grandis* (Brown)]: Carnegie Mus. Annals, v. 39, art. 7, p. 105-114, illus., **1967**. Specimens from Bootlegger Sink, York County, and New Paris Cave in Bedford County are included in a monographic study of the group in which Pleistocene forms are compared with modern forms.
15. Pleistocene zoogeography of the lemming *Dicrostonyx* (Cricetidae: Rodentia), a reevaluation: Colorado Univ. Studies, Ser. Earth Sci. no. 6, p. 61-71, illus., **1968**. Remains of the lemming from the New Paris Cave in Bedford County, and others from elsewhere, are used to determine whether the lemming distribution in North America has been influenced by the Wisconsin glaciation. It is not possible to make a decision at this time.

GUTSCHICK, RAYMOND CHARLES.

1. (and Moreman, Walter Lafayette). Devonian-Mississippian boundary relations along the cratonic margin of the United States, in Internatl. symposium on the Devonian System, v. 2: Calgary, Alberta Soc. Petroleum Geologists, p. 1009-1023, illus., **1967**. Pennsylvania is included. The boundary is placed at base of the Louisiana-Upper Saverton faunal zone in the type Mississippi Valley section which is between the Conewango and Pocono Groups in Butler County, between the Knapp and Oswego Formations in Warren County, and within the Spechtly Kopf Member of the Catskill Formation in Dauphin County.

GWINN, VINTON EDWARD, 1935-1968.

1. (and Bain, D. M.). Penecontemporaneous dolomite in Upper Silurian cyclothems, south-central Pennsylvania [abs.]: Am. Assoc. Petroleum Geologists Bull., v. 48, no. 4, p. 528, **1964**.
2. "Thin-skinned" deformation in the Appalachian Plateau, [western] Pennsylvania, Maryland, and West Virginia [abs.]: Geol. Soc. America Spec. Paper 76, p. 70, **1964**.

3. Thin-skinned tectonics in the Plateau and northwestern Valley and Ridge Provinces of the central Appalachians [central-western Pennsylvania]: Geol. Soc. America Bull., v. 75, no. 9, p. 863-900, illus., **1964**. Folds involve allochthonous Paleozoic rocks which were transported westward along non-outcropping low-angle detachment thrust faults. The soles are to the east. The mode of deformation is similar to that of the southern Appalachians. Anticlines terminate or change trend in groups along west to northwest trending lineaments which may reflect tear faults.
4. (and Clack, William C.). Penecontemporaneous dolomite, Upper Silurian, [central] Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 82, p. 80-81, **1965**.
5. Lateral shortening of layered rock sequences in the foothills regions of major mountain systems: Mineral Industries, v. 36, no. 5, [! 7], p. 1-7, illus., **1967**. The fold-mountains in central Pennsylvania are cited as an example of the response of sedimentary rocks to vertical uplift in nearby mountain ranges. Folds, decollement overthrusts, gravity sliding, and folded thrusts are described. Emphasis is placed upon the mechanics of the deformation.

HAARR, ALLEN P.

1. (and Hempel, John Charles). [Map of] Devil's Den and Falling Creek Caves [Westmoreland County]: Netherworld News, v. 17, no. 2, p. 46-47, illus., **1969**.

HAAS, SKIP.

1. Divining [Pennsylvania caves]: Nittany Grotto News, v. 13, no. 4, p. 61-67, illus., **1965** [not seen].
2. Kingston Cave (Mifflin County, Pennsylvania): Speleo Digest 1965, p. I 65, I 68, illus., **1967**.

HABIB, DANIEL.

1. Distribution of spore and pollen assemblages in the Lower Kittanning Coal of western Pennsylvania: PhD Thesis, Pennsylvania State Univ., **1965**; Palaeontology, v. 9, pt. 4, p. 629-666, illus., **1966**. There is an orderly distribution vertically and horizontally of spore and pollen assemblages. Two new genera and 33 species are described and illustrated.
2. (and Riegel, Walter Leonard, and Spackman, William). Relationships of spore and pollen assemblages in the Lower Kittanning Coal to overlying faunal facies: Jour. Paleontology, v. 40, no. 3, p. 756-759, illus., **1966**. The irregular distribution of the assemblages is due, in part, to ecological factors which influenced the plant groups which were engulfed by the transgressing sea.
3. (and Groth, Peter Klaus Helmut). Paleoecology of migrating Carboniferous peat environments [western Pennsylvania]: Palaeogeography, Palaeoecology, Palaeoclimatology, v. 3, no. 1, p. 185-189, illus., **1967**. Palynological zones in the Lower Kittanning Shale, as well as the relationship between the sulfur in the coal seam and the facies of the overburden, support the hypothesis of causative factors being responsible

for the spatial distribution of spore-and-pollen assemblages in the coal and overburden.

4. Spore stratigraphy and tectonism in the Pennsylvanian System of western Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 121, p. 398, **1969**.

HADLEY, JARVIS BARDWELL.

1. Correlation of isotopic ages, crustal heating and sedimentation in the Appalachian region, in *Tectonics of the southern Appalachians*: Virginia Polytech. Inst., Geol. Dept. Mem. 1, p. 33-44, **1964**; discussions, p. 45. A relation between isotopic ages of thermal events in the Piedmont and Blue Ridge is correlated with clastic-wedge deposition during the Paleozoic. Some of the data is from Pennsylvania.

HAEFNER, RICHARD C.

1. Unusual prehnite crystals from Cornog [Chester County], Pennsylvania: *Rocks and Minerals*, v. 43, no. 9, p. 648-650, illus., **1968**. Isolated, well-formed, mostly microscopic crystals are described. No data about occurrence are included.

HAENTZSCHEL, WALTER.

1. (and El-Baz, Farouk, and Amstutz, Gerhard Christian). Coprolites—an annotated bibliography: Geol. Soc. America Mem. 108, 132 p., illus., **1968**. Coprolites, from the Triassic Lockatong Formation at North Wales, Bucks County, are in the Princeton University collection.

HAGENBUCH, KEITH, *see* Shite, B., 1; White, Elizabeth L., 1.

HAGENBUCH, M. JAY, *see* Shite, B., 1; White, Elizabeth L., 1.

HAIGH, BERTE ROLPH.

1. Memorial to Lloyd Alverno Nelson (1895-1964): Geol. Soc. America Bull., v. 75, no. 11, p. P157-P158, port., **1964**; Am. Assoc. Petroleum Geologists Bull., v. 48, no. 12, p. 1951-1952, port., **1964**.

HALBOUTY, MICHEL THOMAS.

1. Giant oil and gas fields in the United States: Am. Assoc. Petroleum Geologists Bull., v. 52, no. 7, p. 1115-1151, illus., **1968**. The Bradford oil field in northern Pennsylvania is the only giant in the state. It also was the first giant, located in 1879. It is a combination structural and stratigraphic trap field. Various figures are given in tables to compare this field with other giants.

HALL, E., *see* Harrison, James Merritt, 1.

HALL, JAMES, 1811-1898.

1. (and Whitney, Josiah Dwight). Report on the geological survey of the State of Iowa . . . vol. 1, part 2, Palaeontology: Iowa City, p. 473-724, illus., **1858**. *Pleurotomaria tabulata* from the "Coal Measures of [western] Pennsylvania" is described and illustrated.

HALLER, ROBERT.

1. (and Wolf, Lance, and Herbein, Jay T., and Smeltzer, Bernard L.). Hershey-Coy [Cave, Lebanon County]: York Grotto Newsletter, v. 1, no. 10, p. 106-107, 111-112, illus., **1960**.

HAMILTON, HAROLD W., *see* Guilday, John E., 12.

HAMLIN, HOWARD PHILLIPS, *see* Drake, Avery Ala, Jr., 4; O'Neill, Bernard J., Jr., 2.

HAMMOND, EDWIN HUGHES.

1. Classes of land-surface form in the forty-eight states, U. S. A.: Assoc. Am. Geographers Map Suppl. 4, scale, 1:5,000,000, 1963 [**1964**].
2. Classes of land-surface form in the United States—National Atlas of the U. S., sheet 64-61: Washington, D. C., U. S. Geol. Survey, 1 sheet, scale, 1:7,500,000, **1966**.

HANDLIRSCH, ANTON, 1864-1935.

1. Die fossilen Insekten . . . : Leipzig, W. Engelmann, 2 vols., 1908 [not seen].

HANEY, WARREN D.

1. Stratigraphy of Greenbrier Limestone [southwestern] Pennsylvania: Compass, v. 40, no. 4, p. 191-204, illus., **1963**. Two members, an upper limestone and a lower sand-shale unit, are present. It is late Meremacian-early Chesterian in age, and is everywhere less than 100 feet thick.

HANSCOM, ROGER.

1. Structure of the [Precambrian ?] Wissahickon Schist just west of the Susquehanna River, York County, Pennsylvania [abs.]: Pennsylvania Acad. Sci. Proc., v. 39, no. 1, p. 23, **1965**.

HANSMAN, ROBERT HERBERT, *see* Furnish, William Madison, 1.

HAQ, M., *see* Hoque, Momin ul.

HARA, T.

1. (and Sandell, Ernest Birger). Meteoritic abundance of ruthenium: Geochim. et Cosmochim. Acta, v. 21, nos. 1-2, p. 145-150, illus., **1960**. Analyses of the Mount Joy meteorite from Adams County are included. It contains 9.1 ppm Ru, and is a bit above average.

HARDAWAY, JOHN EVANS.

1. Possibilities for subsurface waste disposal in a structural syncline in [Bedford County] Pennsylvania, in Subsurface disposal in geologic basins—A study of reservoir strata: Am. Assoc. Petroleum Geologists Mem. 10, p. 93-127, illus., **1968**. A synclinal basin at Dunning Cove could be used

to dispose of liquid wastes by injecting them into the Silurian Tuscarora Sandstone which has a 15% porosity. It is surrounded by impermeable shales and no faults are present in the area. The shale beds could be used to store wastes in the form of cement slurries pumped into artificially-created fractures.

HARE CHARLES E., *see* Heck, Edward Timmel, 2.

HARPER, CHARLES WOODS, JR., *see* Boucot, Arthur James, 7.

HARPER, JOHN DAVID, *see also* Head, James W., 3d, 4.

1. Late Silurian stratigraphy of New York and [central] Pennsylvania—The Roundout Formation and its correlatives [abs.]: Geol. Soc. America Spec. Paper 121, p. 352-353, **1969**.

HARRISON, JAMES MERRITT.

1. (and Hall, E.). William Edmond Logan [1798-1875]: Geol. Assoc. Canada Proc., v. 15 [pt. 1], p. 33-42, **1963**.

HARRISON, JOHN E.

1. (and Coates, Donald Robert). Deglaciation of the Great Bend region of [northern] Pennsylvania and New York [abs.]: Am. Geophys. Union Trans., v. 47, no. 1, p. 90, **1966**.

HARSHBERGER, JOHN WILLIAM, 1869-1929.

1. The flora of the serpentine barrens of southeast Pennsylvania: Science, new ser. v. 18, p. 339-343, **1903**. Serpentine outcrops contain a distinctive flora and an analysis of the rock, soil, and flora show the latter to be peculiarly distributed due to the physical characteristics of the soil rather than to the chemistry of the original rock.
2. A phyto-geographic sketch of [Chester and Philadelphia Counties] extreme southeastern Pennsylvania: Torrey Bot. Club Bull., v. 31, no. 1, p. 125-159, illus., **1904**. A survey of the vegetation of the region includes much data about the relations of the plants to the topography and soils. The origin of the topography is also discussed.

HART, PETER.

1. Curtain grouting through an embankment—Alvin R. Bush dam [Clinton County] [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 7, p. 91, **1969**.

HART, STANLEY ROBERT.

1. (and Fairbairn, Harold Williams, and Pinson, William Hamet, Jr., and Hurley, Patrick Mason). Use of amphiboles and pyroxenes for K-Ar dating [abs.]: Geol. Soc. America Bull., v. 71, no. 12, pt. 2, p. 1882, **1960**.
2. The use of hornblendes and pyroxenes for K-Ar dating: Jour. Geophys. Research, v. 66, no. 9, p. 2995-3001, illus., **1961**. Hornblende from the

Baltimore Gneiss from near Devault, Chester County, has an age of 960 ± 30 my from K-Ar dating. K-Ar dating of biotite gives an age of 1010 my and Rb-5r dating of the biotite gives an age of 485 my. These data and others from other rocks from elsewhere are used to study the location in and loss of argon from the amphiboles.

HARTLINE, DAN.

1. (and Waser, Paul, and Huntley, Elizabeth, and Johnson, Karen). Leiby Cave [southeastern Pennsylvania]: *Guácharo*, v. 1, no. 1, p. 4-6, illus., **1960**.

HARTMAN, F. R.

1. Central Pennsylvania caves: *Speleo Digest* 1959, p. I61-I66, **1961**.

HARTMAN, RICHARD THOMAS, *see* Walker, Philip Caleb, 1.

HARTMAN, WILLIAM DELL, 1817-1899.

1. Topography and geology of Chester County, in *History of Chester County*: Philadelphia, Everts, p. 435-439, **1881** [not seen].

HARTNER, FLORINE E., *see* Walker, Forrest E., 1.

HARTSHORN, JOSEPH HAROLD.

1. Geologic descriptions of U. S. G. S. topographic maps—Renovo West Quadrangle [Clinton County] Pennsylvania: *Jour. Geol. Education*, v. 15, no. 5, p. 188, 195-196, illus., **1967**. This quadrangle is selected as one of 25 for use by the U. S. Geological Survey to illustrate different geological regions. The drainage development in the Appalachian Mountains is emphasized.

HARTSOCK, JACK.

1. Central Pennsylvania mineral collecting localities: *Nittany Grotto News* v. 11, no. 5, p. 83, 93, **1963**. A brief listing of locations where 17 different minerals associated with sedimentary rocks of the region is given.

HARVEY, ARNOLD H., *see* Greene, Gordon William, 1; Moxham, Robert Morgan, 1.

HASKIN, LARRY, *see* Schofield, Allan 1.

HASSEMER, JERRY.

1. Graysville Cave (Huntingdon County, Pennsylvania): *Spelco Digest* 1959, p. I74-I75, illus., **1961**.

HAUER, PETER M.

1. Stoverdale no. 3, Cave, Dauphin County: *York Grotto Newsletter*, v. 8, no. 1, p. 6, illus., **1966**.

2. Casino Cave . . . Lebanon County, Pennsylvania: York Grotto Newsletter, v. 9, no. 1, p. 7-8, illus., 1967.
3. Corker Hill Cave . . . Franklin County, Pennsylvania: Shippensburg Grotto Newsletter, v. 2, no. 3, p. [20-22], illus., 1967; York Grotto Newsletter, v. 9, no. 1, p. 6-7, 11-12, illus., 1967.
4. Schaefferstown Cave . . . Lebanon County, Pennsylvania: York Grotto Newsletter, v. 8, no. 6, p. 78-79, illus., 1967.
5. Devil's Den Cave [Westmoreland County]: York Grotto Newsletter, v. 9, no. 4, p. 46, 48, illus., 1968.
6. (and Young, James). Willis Run Pit [Cave] . . . York County, Pennsylvania: York Grotto Newsletter, v. 9, no. 5, p. 57-58, illus., 1968.

HAY, RUTH J., *see* Ogden, James Gordon, 3d, 2.

HEAD, JAMES W., 3d.

1. Stratigraphy of the upper part of the Helderberg Group (Lower Devonian) of southern Pennsylvania, Maryland, and northern West Virginia [abs.]: Geol. Soc. America, Spec. Paper 115, p. 270, 1968.
2. Correlation and paleogeography of the upper part of the Helderberg Group (Lower Devonian) of the central Appalachians [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 7, p. 95, 1969.
3. Directional determination of the Late Silurian-Early Devonian marine transgression in the central Appalachians [abs.]: Geol. Soc. America Spec. Paper 121, p. 354-355, 1969.
4. (and Harper, John David, and LaPorte, Léo Frédérick, and Anderson, Edwin Joseph). Paleogeography and environmental reconstruction of Late Silurian-Early Devonian time in the Appalachian Basin [abs.]: Geol. Soc. America Spec. Paper 121, p. 355-356, 1969.

HEALD, MILTON TIDD.

1. Porosity variation in the Oriskany Sandstone of eastern West Virginia and central Pennsylvania [abs.]: West Virginia Acad. Sci. Proc. 1962, v. 34, p. 150, 1962.

HECK, EDWARD TIMMEL.

1. Hydraulic fracturing in light of geologic conditions: Producers Monthly, v. 24, no. 11, p. 12-13, 16-19, illus., 1960. Examples from Devonian sandstones in the Bradford oil field in McKean County are used to show the influence of jointing on hydraulic fracturing. Rocks fail along zones of weakness, hence a knowledge of jointing will help in making decisions regarding fracturing.
2. (and Hare, Charles E., and Hoskins, Homer Arthur). Appalachian connate water: West Virginia Geol. Survey Bull. 28, 42 p., illus., 1964. A general discussion of the origin of connate water, as being indeed trapped sea water, is followed by interpretation of analyses from many wells. Some from western Pennsylvania are considered of moderate concentration.

HECKEL, PHILLIP HENRY.

1. Devonian Tully Limestone in [central] Pennsylvania and comparison to type Tully Limestone in New York: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 60, 31 p., illus., **1969**. The Tully in Pennsylvania contains much more shale than it does in New York. Many petrographic descriptions are included.

HEDBERG, WILLIAM HOLLIS.

1. Point bar sedimentation at Halfmoon Creek [Centre County], Pennsylvania: MS Thesis, Pennsylvania State Univ., **1962**.

HEDLEY, MATHEW SHERWOOD.

1. Memorial to Paul Billingsley (1887-1962): Geol. Soc. America Bull., v. 75, no. 9, p. P133-P137, port., **1964**.

HEEREN, LILLIAN A., *see* Bergsten, John M., 1; Lytle, William Stuckley, 6, 9.

HELY, ALLEN GRANT, *see also* Olmsted, Franklin Howard, 2; Parker, Garald Gordon, 1.

1. (and Olmsted, Franklin Howard). Some relations between stream-flow characteristics and the environment in the Delaware River region [south-eastern Pennsylvania]: U. S. Geol. Survey Prof. Paper 417B, p. B1-B25, illus. incl. geol. map, **1963**. The influence of geological factors on stream-flow characteristics is investigated. These, accompanied by precipitation variations, account for a very large proportion of the variation in average runoff and low-flow characteristics.

HEMPEL, JOHN CHARLES, *see also* Haarr, Allen P., 1.

1. Caves of western Pennsylvania [Part 1]: Netherworld News, v. 17, no. 4, p. 146-192, illus., **1969**; Part 2, no. 5, p. 231-271, illus., **1969**. Caves are listed by county. Descriptions of all and maps of most are included.

HENDERSON, EDWARD PORTER.

1. Hexahedrites: Smithsonian Misc. Collections, v. 148, no. 5, 41 p., illus., **1965**. The Mt. Joy, Adams County, meteorite is considered with many others from elsewhere in a discussion of this type of meteorite. They are not randomly scattered throughout the United States but appear to be in strewn fields. The New Baltimore, Somerset County, iron is also described, but it is not a hexahedrite.

HENDERSON, JOHN RICHARD, JR.

1. Structural analysis of the Chickies Creek area [Lancaster County], south-eastern Pennsylvania: MS Thesis, Northwestern Univ., **1965**.
2. Uniform tectonic transport directions and variable fold axis orientations, Lancaster County, Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 101, p. 261, **1968**.
3. Tectonic significance of minor structures in Conococheague Formation near Lancaster [Lancaster County], Pennsylvania: Am. Jour. Sci., v. 267,

no. 2, p. 166-180, illus., **1969**. Deformed oolites show that the rocks have undergone 3-dimensional strain involving constriction. S_1 and L' mark the principal flattening plane and elongation direction; small folds may have originated by simultaneous buckling in two principal strain directions.

HENDERSON, JOHN RICHARD, SR., *see also* Bromery, Randolph Wilson, 4, 5, 7, 9, 11, 13, 14, 15, 18, 20, 22, 23.

1. (and Johnson, Robert William, Jr., and Gilbert, Francis Paul). Aeromagnetic map of the Wilmington, Delaware area and adjacent parts of [Chester County] Pennsylvania and Maryland: U. S. Geol. Survey Geophys. Invs. Map GP 363, scale, 1:62,500, **1963**.
2. (and Andreasen, Gordon Ellsworth, and Petty, A. J.). Aeromagnetic map of northern New Jersey and adjacent parts of New York and [Bucks and Northampton Counties] Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 562, scale, 1:250,000, **1966**.

HENDERSON, ROLAND GEORGE.

1. Henry R[ochambeau] Joesting: (1903-1965): Am. Assoc. Petroleum Geologists Bull., v. 49, no. 10, p. 1729-1732, port., **1965**; Geophysics, v. 30, no. 5, p. 938-942, port., **1965**.

HENNINGER, BERNARD ROBERT, *see also* Martin, Wayne Dudley, 1, 2.

1. The type Waynesburg Sandstone [Pennsylvanian] of southwestern Pennsylvania and adjacent areas: MS Thesis, Miami Univ., **1964**.

HERBEIN, JAY T., *see also* Gettel, Phillip E. A., 2, 3, 4; Haller, Robert, 1.

1. Ebersole Quarry Caves, Dauphin County: York Grotto Newsletter, v. 4, no. 3, p. 39-40, 43-45, illus., **1962**.
2. New cave in Dauphin County—Stoverdale no. 2: York Grotto Newsletter, v. 3, no. 7, p. 103-105, illus., **1962**.
3. The strange story of Lemoyne Cave [Cumberland County]: York Grotto Newsletter, v. 3, no. 11, p. 161-162, 168, illus., **1962**.
4. [Map of] Hummelstown Quarry Cave, Dauphin County: York Grotto Newsletter, v. 6, no. 3, p. 35-36, **1964**.
5. (and Speece, Jack H.). [Map of] Mistake Cave, Fulton Co., Pa.: York Grotto Newsletter, v. 9, no. 6, p. 73, illus., **1968**.

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1. Report about the mines in the United States of America, 1783: translated by Amandus Johnson: Philadelphia, **1931** [not seen].

HERZOG, LEONARD FREDERICK, JR., *see* Deines, Peter, 2.

HESS, HARRY HAMMOND, 1906-1969.

1. Richard Montgomery Field (1885-1961): Am. Geophys. Union Trans., v. 43, no. 1, p. 1-3, port., **1962**.

HEYL, ALLEN VAN, JR., *see also* Brock, Maurice Rex, 1; Jolly, Janice Laurene Willard, 1; McKnight, Edwin Thor, 1, 2, 3; Pearre, Nancy C., 1; Zartman, Robert Eugene, 2.

1. (and Bozion, Constantine N.). Oxidized zinc deposits of the United States—Part 1, General geology: U. S. Geol. Survey Bull. 1135A, p. A1-A52, illus., **1962**. Such deposits occur at Friedensville, Lehigh County, at Pequa and Bamford, Lancaster County, at Sinking Valley, Blair County, at Phoenixville, Chester County, and at the Doughty Mine in Northumberland County. All are direct replacement deposits; Friedensville also contains saprolitic accumulations. Hemimorphite and smithsonite are the chief minerals.

HEYMAN, LOUIS, *see also* Kelley, Dana Robineau, 5; Lytle, William Stuckley, 19, 20.

1. Geology of the Elk Run gas pool, Jefferson County, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. M 59, 18 p., illus., **1969**. The pool is in a stratigraphic trap in the Ridgeley Sandstone of the Oriskany Group of Devonian Age. The trap is due to an up-dip porosity loss on the flank of the Sabinsville anticline.

HIBBARD, CLAUDE WILLIAM.

1. (and Ray, Clayton Edward, and Savage, Donald Elvin, and Taylor, Dwight Willard, and Guilday, John E.). Quaternary mammals of North America, in *The Quaternary of the United States*: Princeton, New Jersey, Princeton Univ. Press, p. 509-525, illus., **1965**. A general summary of the nature and distribution of mammals includes those which have been found in several cave sites in Pennsylvania.

HIGBEE, HOWARD WILLIAM.

1. The soils of Fulton County, Pennsylvania: Pennsylvania Agric. Exper. Sta. [Bull. 487], 102 p., illus., **1947**. A discussion of the soils includes a description of the parent rock from which they were derived.
2. Land resource map of Pennsylvania: University Park, Pennsylvania State Univ., Agriculture Exper. Sta., scale, 1:380,160, **1967**. A soils map includes tabular information about the geological source of the soils as well as physiographic location, and also various physical and agricultural properties of the areas.

HIVNER, BARRY.

1. (and Smeltzer, Bernard L.). [Map of] Craighead Cave, Cumberland Co., Pa.: York Grotto Newsletter, v. 2, no. 9, p. 137, **1961**.
2. Lemoyne Cave [Cumberland County]: York Grotto Newsletter, v. 2, no. 10, p. 149-150, illus., **1961**.
3. Railroad Bridge Cave (Cumberland County, Pennsylvania): York Grotto Newsletter, v. 2, no. 6, p. 94, 99, illus., **1961**; *Speleo Digest* 1961, p. 120, illus., **1963**.
4. Staliper Cave, Franklin County: York Grotto Newsletter, v. 3, no. 1, p. 13-14, illus., **1961**; *Speleo Digest* 1961, p. 112-113, illus., **1963**.

5. Walnut Bottom Cave [Cumberland County] Pennsylvania: York Grotto Newsletter, v. 2, no. 9, p. 127-129, 134, illus., **1961**; Speleo Digest 1961, p. 136, 138, illus., **1963**.
6. Baker Cave no. 3 [Franklin County]: York Grotto Newsletter, v. 3, no. 6, p. 87-88, 90, illus., **1962**.
7. Hershey-Coy [Cave] correction (Cumberland County): Speleo Digest, 1960, p. 121-122, illus., **1962**.
8. Indian Cave . . . Fulton County: York Grotto Newsletter, v. 5, no. 12, p. 130-131, illus., **1964**.

HIKSON, GEORGE, *see also* Slobodian, Scott, 1.

1. Earl White's Cave, Centre County: Nittany Grotto News, v. 9, no. 6, p. 96-98, illus., **1961**; Speleo Digest 1961, p. 144-148, illus., **1963**.
2. Horsebone Slump Cave, Huntingdon County: Nittany Grotto News, v. 9, no. 8, p. 143-144, illus., **1961**; Speleo Digest 1961, p. 154-155, illus., **1963**.
3. Bruckerhoff Cave extension (Centre County, Pennsylvania): Speleo Digest 1960, p. 132, illus., **1962**.
4. Eiswert no. 3 cave . . . Lycoming County: Nittany Grotto News, v. 10, no. 10, p. 183, 185, illus., **1962**; Speleo Digest 1962, p. 166-167, illus., **1964**.
5. Loganton Cave, Clinton County: Nittany Grotto News, v. 10, no. 10, p. 184-185, illus., **1962**.

HOAGLAND, ALAN DOUGLAS.

1. Appalachian strata-bound deposits—their essential features, genesis, and the exploration problem [abs.]: Econ. Geology, v. 64, no. 3, p. 351, **1969**.

HOARE, JOSEPH McCORMICK.

1. (and Latham, Ernest Hartwell). Don John Miller (1919-1961): Am. Assoc. Petroleum Geologists Bull., v. 46, no. 8, p. 1534-1537, port., **1962**.

HOBSON, JOHN PETER, JR.

1. Stratigraphy of the Beckmantown Group in southeastern Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. G 37, 331 p., illus., **1963**. Four formations, the Stonehenge, Rickenback, Epler, and Ontelaunee, are recognized and correlated. Petrographic details are included, and regional stratigraphy is related to the stratigraphic framework of southeastern Pennsylvania. Fossils are listed.

HOCH, JOHN HAMPTON, *see* Roney, Grady, 1.

HODGSON, D. A.

1. The morphology of an area of patterned ground in central Pennsylvania: MS Thesis, Pennsylvania State Univ., **1967**.

HODGSON, W. A.

1. Carbon and oxygen isotope ratios in diagenetic carbonates from marine sediments: *Geochim. et Cosmochim. Acta*, v. 30, no. 12, p. 1223-1233, illus., **1966**. Limestone studies from the Elk Creek Formation near Girard, [Erie County] are included with those from others to demonstrate that diagenetic limestones are distinct from normal marine limestones and should be taken into account in paleoenvironmental studies.

HOLDEN, JOHN C., *see* Dietz, Robert Sinclair, 1.

HOLE, GILBERT LEE.

1. Geology of the Hanover quarry, Hanover [Adams County], Pennsylvania, *in* The geology of mineral deposits in southcentral Pennsylvania—Field Conf. Pennsylvania Geologists, 33rd: Harrisburg, Pennsylvania Bur. Topog. and Geol. Survey, p. 11-15, illus., **1968**. Quarries in the Cambrian Ledger Formation are described. The formation, taken for metallurgical stone, is composed mainly of fairly pure beds of dolomite and limestone; some zones are highly siliceous, and are used for building stone. Iron and alumina are also impurities but are rare. The stratigraphy and structure of the rocks in the quarry are explained. The structure is very complex and exploration is done by diamond drilling.

HOLLAND, HEINRICH DIETER.

1. The chemical evolution of some cave waters [abs.]: *Natl. Speleol. Soc. Bull.*, v. 26, no. 2, p. 69, **1964**.
2. (and Kirsiper, Theodore V., and Huebner, J. Stephen, and Oxburgh, Ursula M.). On some aspects of the chemical evolution of cave waters: *Jour. Geology*, v. 72, no. 1, p. 36-67, illus., **1964**. Three stages are recognized: carbonation in the soil zone; solution of calcite and/or dolomite; and equilibrium of cave water with cave air. Examples are studied from Indian Echo Cave in Dauphin County and Carpenter Cave in Lehigh County.

HOLLOWELL, JERRALD R., *see* Carswell, Louis Duncan, 2.

HOLLYDAY, ESTE F., *see* Seaber, Paul Robert, 1, 2, 3, 5.

HOLMES, RALPH JEROME.

1. Paul Francis Kerr: *Am. Mineralogist*, v. 50, no. 10, p. 1519-1531, **1965**.

HOOPER, WILLIAM FRANKLIN.

1. (and Earley, James William). Compositional logging of air-drilled wells [Clearfield County]: *Am. Assoc. Petroleum Geologists Bull.*, v. 45, no. 11, p. 1870-1883, illus., **1961**. Two wells in the county, 18 miles apart, have had very precise correlations of the Devonian to Pennsylvanian rocks made on the basis of routine X-ray analysis of the minerals from air-drilled cuttings. The method is as accurate as electric logging.

HOOVER, HENRY.

1. Diving at Carpenter's Spring [Cave] (Lycoming County, Pennsylvania): *Spelco Digest* 1960, p. 127, illus., **1962**.
2. Diving at Eiswert no. 1 [Cave] (Lycoming County, Pennsylvania): *Speleo Digest* 1960, p. 127-129, illus., **1962**.

HOPKINS, WILLIAM B.

1. (and Simpson, Thomas A.). Montana earthquakes noted in [northeastern] Pennsylvania mine-water pools: *Am. Geophys. Union Trans.*, v. 41, no. 2, p. 435-436, **1960**. Recorders show a change in water level in 3 different mine-pools, reflecting the passage of earthquake waves as the rocks were compressed and then released.

HOQUE, MOMIN UL.

1. Stratigraphy, petrology, and palaeogeography of the Mauch Chunk Formation in south-central and western Pennsylvania: PhD Thesis, Univ. Pittsburgh, **1965**; [abs.], *Dissert. Abs.*, B, v. 27, no. 7, p. 2412B, **1967**.
2. [Mississippian] Mauch Chunk sediments—transport pattern and sediment source [abs.]: *Geol. Soc. America Spec. Paper* 101, p. 260, **1968**.
3. Sedimentologic and paleocurrent study of Mauch Chunk sandstones (Mississippian), south-central and western Pennsylvania: *Am. Assoc. Petroleum Geologists Bull.*, v. 52, no. 2, p. 246-263, illus., **1968**. Thin section, size, and core analyses make up the bulk of the study. Subgraywacke is the predominant type, and protoquartzite also occurs. The subgraywackes are fluvial with a dominant direction from east to west. The protoquartzites are from the nearshore marine environment. The Mauch Chunk is wedge-shaped and thins westward, and appears to have been deposited in a molasse-basin.

HORBACK, HENRY.

1. (and Olsen, Edward John). Catalog of the collection of meteorites in the Chicago Natural History Museum: *Fieldiana—Geology*, v. 15, no. 3, 319 p., **1965**. Included are fragments of Bald Eagle (Lycoming County), Mount Joy (Adams County), New Baltimore (Somerset County), Pittsburgh (Allegheny County), and Shrewsbury (York County) are present in the collection.

HORNE, JOHN C., *see* Wanless, Harold Rollin, 2.

HOROWITZ, DANIEL HENRY.

1. Petrology of the Upper Ordovician and Lower Silurian rocks in the central Appalachians: PhD Thesis, Pennsylvania State Univ., **1965**; [abs.], *Dissert. Abs.*, v. 26, no. 4, p. 2134, **1965**.
2. Evidence for deltaic origin of an Upper Ordovician sequence in the central Appalachians, *in* *Deltas in their geologic framework*: Houston, Texas, *Houston Geol. Soc.*, p. 159-169, illus., **1966**. The Upper Ordovician clastic sediments in central Pennsylvania are cited as examples of deposits from deltas prograding westward as a result of the Taconic uplift to the east. Sections from several areas are compared.

3. Diagenetic reduction and alteration of the Upper Ordovician Oswego Formation in the central Appalachian Mountains [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 7, p. 108, **1969**.

HORVATH, ALLAN L.

1. A teacher's legacy—Dr. August F[rederick] Foerste [1862-1936]: Explorer, v. 9, no. 4, p. 20-22, illus., **1967**.

HOSKINS, DONALD MARTIN, *see also* Conlin, Richard Renault, 1; Oliver, William Albert, Jr., 2, 4.

1. Fossils from the red beds of the [Silurian] Bloomsburg Formation of central Pennsylvania [abs.]: Geol. Soc. America Bull., v. 71, no. 12, pt. 2, p. 1891, **1960**.
2. Stratigraphy and paleontology of the Bloomsburg Formation of Pennsylvania and adjacent states: PhD Thesis, Bryn Mawr College, **1960**; Pennsylvania Geol. Survey, 4th ser. Bull. G 36, 125 p., illus., **1961**. A detailed discussion of the petrology, paleontology, and correlation of this Silurian unit is given. Fossils are rare in the red beds except for brachiopods and ostracods. The formation was deposited in brackish water as part of a large deltaic body.
3. Common fossils of Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Educ. Ser. no. 2, [18 p.], illus. [**1962**]. This is a popular account of the common types of invertebrates and plants found in the state. No collecting locations are included, however.
4. (and others). Lithology, subdivision and correlation of the Catskill Formation in east-central Pennsylvania, *in* Symposium on the Middle and Upper Devonian stratigraphy of Pennsylvania and adjacent states: Pennsylvania Geol. Survey, 4th ser. Bull. G 39, p. 147-163, illus., **1963**. A detailed stratigraphic analysis is included. New names and new correlations are suggested for subdivisions of the Susquehanna Group.
5. A provisional Silurian to Mississippian rock-stratigraphic column for central Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 37, p. 199-205, illus., **1963**. The lithostratigraphic units in use by the Pennsylvania Geological Survey are briefly described. Many old names are discarded. Well-exposed sections of the units are cited.
6. (and Conlin, Richard Renault). Structural features of the folded Appalachians in central Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 73, p. 174, **1963**.
7. Structural features of the rocks bordering the anthracite fields, *in* Geology of the southern part of the [northeastern] Pennsylvania Anthracite Region—Field trip no. 4, 1963: New York, Geol. Soc. America, p. 17, **1963**. Devonian rocks are similarly-deformed as are the anthracite-bearing Pennsylvanian beds save for the absence of the numerous, folded, low-angle thrusts which are common to the anthracite fields. Relatively few faults of any type occur in the Devonian rocks.
8. Sub-carboniferous rocks, *in* Geology of the southern part of the [northeastern] Pennsylvania Anthracite Region—Field trip no. 4, 1963: New York, Geol. Soc. America, p. 12-13, **1963**. A cursory description of the

Upper Devonian Catskill Formation in the southern Anthracite Region is given. It unconformably underlies the Mississippian Pocono Formation.

9. Fossil collecting in Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. G 40, 126 p., illus. incl. geol. map, **1964**, revised, **1969**. A general summary of the major groups of plants and animals is followed by specific directions to locations by county. Included also is a catalog of fossil displays in museums and colleges in the state. A small-scale map is included.
10. Relationship of thrust faults to plunging anticlines in south-central Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 87, p. 81, **1966**.
11. Origin of locally overturned strata in northern Dauphin County, Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 40, no. 2, p. 99-103, illus., **1967**. Overturned Mississippian Pocono strata north of Millersburg interrupt the normal dip of the rocks in the area, and are the result of local faulting which dragged some of the rocks on the lower plate into an overturned position.

HOSKINS, HOMER ARTHUR, *see* Heck, Edward Timmel, 2.

HOSTERMAN, JOHN WALLACE, *see also* Epstein, Jack Burton, 5; Roen, John B., 3.

1. White clay deposits near Mt. Holly Springs, Cumberland County, Pennsylvania, *in* The geology of mineral deposits in south-central Pennsylvania—Field Conf. Pennsylvania Geologists, 33rd: Harrisburg, Pennsylvania Bur. Topog. and Geol. Survey, p. 38-51, illus., **1968**; *in* Geological Survey research 1969: U. S. Geol. Survey Prof. Paper 650 B, p. B66-B72, illus., **1969**. White clay occurs from the weathered phyllite member of the Tomstown Formation of Cambrian age, near a fault contact with the Antietam Quartzite. The white clay, variegated silty clay, and weathered phyllite show progressive differences in particle size content, clay mineral ratio, and SiO_2 and Fe_2O_3 content. Numerous analyses are included. The clays could be weathering products or from hydrothermal alteration, the latter being more likely.

HOUGH, JACK LUIN.

1. Geologic framework, *in* Great Lakes basin—a symposium: Am. Assoc. Adv. Sci. Pub. 71, p. 3-27, illus., **1962**. The northwestern portion of the state and a portion of a drainage area in northern Pennsylvania are in the basin. The rocks are entirely sedimentary; the lake basins were gouged deeper during the Pleistocene glaciation. Several levels are recognized, some being in Erie County.
2. The prehistoric Great Lakes of North America, *in* Science in progress, 15th series: New Haven, Yale Univ. Press, p. 167-208, illus., **1966**. A general summary of the geology of the Great Lakes basin and the Quaternary alteration of the area includes that portion of northwestern Pennsylvania adjacent to Lake Erie.

HOUGH, VAN NESS D., *see* Nickelsen, Richard Peter, 3.

HOUP, MIKE.

1. [Map of] Blue Spring Cave, [Franklin County]: York Grotto Newsletter, v. 8, no. 1, p. 16, **1966**.
2. Del's Pit [Cave] . . . Franklin County: York Grotto Newsletter, v. 9, no. 2, p. 18-19, illus., **1967**.
3. Long Farm Cave . . . Franklin Co., Pa.: York Grotto Newsletter, v. 10, no. 5, p. 77, illus., **1969**.

HOUSE, MICHAEL R.

1. Succession of *Tornoceras* and related genera in the Devonian of New York and adjacent states [abs.]: Am. Assoc. Petroleum Geologists Bull., v. 48, no. 4, p. 532, **1964**.

HOWELL, BENJAMIN FRANKLIN, JR., *see also* Ackermann, Hans Dietrich, 1.

1. Geophysical studies of the Appalachian area: Mineral Industries, v. 30, no. 5, p. 1-8, illus., **1961**. A cursory review of various geophysical techniques in use is followed by specific application in the Appalachian area, including Pennsylvania. No new information is included, however. It is a review of certain important geophysical investigations in the Appalachians.

HOY, ROBERT BECK.

1. Memorial to Arthur Coe Spencer (1871-1964): Geol. Soc. America Bull., v. 77, no. 7, p. P139-P144, **1966**.

HRYCKOWIAN, EUGENE.

1. (and Dachille, Frank). Induced changes of the minerals in anthracite coals [abs.]: Geol. Soc. America Spec. Paper 68, p. 202-203, **1962**.
2. (and Dachille, Frank, and Dutcher, Russell Richardson). Pressure-temperature studies of [northwestern Pennsylvania] anthracite in closed systems to 2 Kb and 900° C [abs.]: Geol. Soc. America Spec. Paper 73, p. 175, **1963**.
3. (and Dutcher, Russell Richardson, and Dachille, Frank). Experimental studies of [northeastern Pennsylvania] anthracite coals at high pressures and temperatures: Econ. Geology, v. 62, no. 4, p. 517-539, illus., **1967**. Observations correlate with existing theories on coal metamorphosis, pyrolysis and structure, which have been extended from lower rank coals.

HU, CHUNG-HUNG.

1. The ontogeny and dimorphism of *Welleraspis lata* Howell (Trilobita) [Bucks County]: Jour. Paleontology, v. 38, no. 1, p. 95-97, illus., **1964**. *Welleraspis lata* from the Cambrian Limeport Formation in Bucks County is described and illustrated. Males and females, and five growth stages, are recognized.

HUBBERT, MARION KING.

1. History of petroleum geology and its bearing upon present and future exploration: Am. Assoc. Petroleum Geologists Bull., v. 50, no. 12, p. 2504-2518, illus., **1966**. Included are discussions of the earliest oil geology literature and persons, much of which is from Pennsylvania.

HUDDLE, JOHN WARFIELD, *see also* Oliver, William Albert, Jr., 2, 4.

1. (and Patterson, Sam Hunting). Origin of Pennsylvania underclay and related seat rocks: Geol. Soc. America Bull., v. 72, no. 11, p. 1643-1660, illus., **1961**. Sedimentary petrographic studies show that all of the various types of seat rocks, including underclays, can be explained by leaching of the substratum in Pennsylvanian swamps. Many of the examples come from Pennsylvania.
2. Upper Devonian conodont zones in western New York and [northwestern] Pennsylvania [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 1, p. 29, **1969**.

HUEBER, FRANCIS M.

1. Coal—origin of a valuable natural resource: Washington, D. C., Natl. Coal Assoc., 10 p., illus., **1966** [not seen].

HUEBNER, J. STEPHEN, *see* Holland, Heinrich Dieter, 2.

HULL, JOSEPH POYER DEYO, JR., 1889-1967.

1. Appalaehian anticlines need more testing: Oil and Gas Jour., v. 63, no. 31, p. 178-180, illus., **1965**. Examples from central Pennsylvania are cited in an exhortation to more fully investigate anticlines. Numerous anticlines which have been overthrust upon less-deformed rocks are known, some of which, Cambrian and Ordovician, are known to be porous.

HUNT, CHARLES BUTLER.

1. Physiography of the United States: San Francisco, W. H. Freeman and Co., 480 p., illus., **1967**. A general summary of the geological origin of physiographic features is followed by a review of the various provinces. Those of Pennsylvania are also included.

HUNTER, RALPH EUGENE, *see also* Sheppard, Richard A., 1.

1. Iron sedimentation in the Clinton Group of the central Appalachian Basin: PhD Thesis, Johns Hopkins Univ., **1961**.
2. Eolian microridges on modern beaches and a possible ancient example [Mifflin County]: Jour. Sed. Petrology, v. 39, no. 4, p. 1573-1578, illus., **1969**. Structures from the Silurian Keefer Sandstone, in exposures near Lewistown, may be examples of eolian microridges.

HUNTLEY, ELIZABETH, *see* Hartline, Dan, 1.

HURLBUT, CORNELIUS SEARLE, JR.

1. Memorial of Esper Signius Larsen, Jr. [1879-1961]: Am. Mineralogist, v. 47, nos 3-4, p. 450-459, port., **1962**.
2. Memorial of Hugh Exton McKinstry [1897-1961]: Am. Mineralogist, v. 47, nos. 3-4, p. 464-469, port., **1962**.

HURLEY, PATRICK MASON, *see* Hart, Stanley Robert 1; Whitney, P. R., 1.

HUTCHINS, THOMAS, 1730-1789.

1. Western Pennsylvania in 1760. A journal of a march from Fort Pitt to Venango, and from thence to Presque Isle: Pennsylvania Mag. History and Biography, v. 2, p. 149-153, **1878**. Early descriptions of the topography of that part of western Pennsylvania are included.

HYDE, JESSE EARL, 1884-1936.

1. (and Marple, Mildred Fisher). Mississippian formations of central and southern Ohio: Ohio Div. Geol. Survey Bull. 51, 355 p., illus., **1953**. *Platyceras (Orthonychia) lodiensis* (Meek) from the Waverly Formation in Warren County is illustrated.

HYDE, LEWIS.

1. . . . Blue Hole Cave . . . Blair County: Netherworld News, v. 10, no. 2, p. 24-26, illus., **1962**.
2. Slennut Tunnels [Cave, Allegheny County]: Netherworld News, v. 10, no. 2, p. 28-29, illus., **1962**.

IBBERSON, DALE.

1. Fertility Cave, Lancaster County: York Grotto Newsletter, v. 8, no. 1, p. 5, illus., **1966**.

ILLING, VINCENT CHARLES, 1890-1969.

1. Arville Irving Levorsen [1894-1965]: Geol. Soc. London Proc. 1965-66, no. 1636, p. 203-204, **1967**.

INGHAM, ALBERT IRWIN.

1. Oil and gas frontiers in the east: GeoTimes, v. 4, no. 6, p. 14-16, 33-34, **1960**. This is a general summary of the oil and gas potential of Pennsylvania and other eastern states. All of the Paleozoic rocks are considered as possible sources.

IRVING, EDWARD, *see also* Roy, Jean L., 2.

1. (and Brown, David Alexander). Abundance and diversity of the labyrinthodonts as a function of paleolatitude: Am. Jour. Sci., v. 262, no. 6, p. 689-708, illus., **1964**. The distribution and diversity for Permian and Triassic amphibians is similar, with reference to relative latitude, as are present-day forms. Some are from the Commonwealth and show Pennsylvania to have been about 10° S during the Permian and about 10° N during the Triassic. These are compared favorably with paleomagnetic results.
2. (and Opdyke, Neil D.). The palaeomagnetism of the Bloomsburg red beds [Columbia County] and its possible application to the tectonic history of the Appalachians: Geophysical Jour., v. 9, nos. 2-3, p. 153-167,

illus., **1965**. Two directions of remanent magnetism are used to suggest that one direction was created during deposition when the Appalachian trend was straight, and the second was imposed during the time the Appalachians were bent.

ISAACS, KALMAN.

1. Recognition of structures from airborne magnetics: Am. Assoc. Petroleum Geologists Bull., v. 50, no. 7, p. 1502-1506, illus., **1966**. An example from Luzerne County is used, along with others from elsewhere, that geological interpretation of magnetic anomalies directly into geologic structures is possible. An example of a syncline in the coal fields is shown by the linear pattern of some anomalies.

ISACHSEN, YUGVAR WILLIAM.

1. Extent and configuration of the Precambrian in the northeastern United States: New York Acad. Sci. Trans., ser. 2, v. 26, no. 7, p. 812-829, illus., **1964**. A general summary shows the basement dipping from -6,000 feet in northwestern Pennsylvania to depths below -40,000 feet in the central part of the Allegheny Synclinorium, with a few isolated uplifts in southeastern Pennsylvania.

JACKENS, R. C., see Kuo, John Tsung Fen, 1.

JACKSON, GEORGE F.

1. Pennsylvania's largest tectonic cave [Wind Cave, Lancaster County]: Netherworld News, v. 10, no. 11, p. 209-213, illus., **1962**; Speleo Digest 1962, p. 172-175, illus., **1964**.
2. Ron Martin Cave, Northumberland County: Nittany Grotto News, v. 11, no. 7, p. 130-133, illus., **1963**; Speleo Digest 1963, p. 121-123, illus., **1965**.

JACKSON, ROBERT TRACY, 1861-1948.

1. Phylogeny of the Echini, with a revision of Paleozoic species: Boston Soc. Nat. Hist. Mem. 7, 489 p., illus., **1912**. *Hyattechinus rarispinus*, *H. pentagonus*, and *H. beecheri* from (?) Mississippian rocks in Erie and Warren Counties are described and illustrated.

JAEGER, RALPH ROGER.

1. (and Lipschutz, Michael Elazar). Implications of shock effects in iron meteorites: Geochim. et Cosmochim. Acta, v. 31, no. 10, p. 1811-1832, illus., **1967**. The New Baltimore, Somerset County meteorite, with many others, is used to show that 50% of all meteorites have been subjected to a great shock before arriving on earth, a single collision about $650 \pm 60 \times 10^6$ years ago is evident. The nature of the colliding celestial bodies is speculated upon.

JAFFE, ELIZABETH BOUDREAU, see Jaffe, Howard William, 1.

JAFFE, HOWARD WILLIAM.

1. (and Jaffe, Elizabeth Boudreau). Memorial of Albert Williams Postel (Jan. 5, 1909-May 11, 1966): *Am. Mineralogist*, v. 53, nos. 3-4, p. 586-590, port., **1968**.

JAIN, ANANT V.

1. (and Lipschutz, Michael Elazar). Shock histories of hexahedrites and Ga-Ge Group III octahedrites, *in* Meteorite research: New York, Springer-Verlag, p. 826-837, illus., **1969**. X-ray and metallographic studies on meteorites including Mount Joy (Adams County) show it to be pre-terrestrially shocked, but below 130 kb.

JAMES, ARTHUR E.

1. A brief history of the geology and mineralogy of Chester County, *in* Southeastern Pennsylvania, v. 1: Philadelphia, Lewis Historical Publishing Co., p. 177-196, illus., **1943**. A generalized, historical account of the development of the mineral industry is given. Included is a list of minerals known from the county and an account of the occurrence of some of them. Many are as mineral deposits.

JAMES, DAVID EVAN.

1. Crustal structure of the Middle Atlantic states [abs.]: *Earthquake Notes*, v. 37, no. 4, p. 16, **1966**.
2. Crustal structure of the Middle Atlantic states: PhD Thesis, Stanford Univ., **1967**; [abs.], *Dissert. Abs. B*, v. 27, no. 12, p. 4453B, **1967**.
3. (and Smith, Thomas Jefferson, and Steinhart, John Shannon). Crustal structure of the Middle Atlantic states: *Jour. Geophys. Research*, v. 73, no. 6, p. 1983-2007, illus., **1968**. The thickness of the crust above the Moho has been determined from over 200 ECOOE time-terms. Small-scale maps include central and part of southwestern Pennsylvania. The crustal thickness varies from 40 to 55 km, being thickest in the center of the state.

JARON, MICHAEL G., *see also* O'Neill, Bernard J., Jr., 2.

1. Petrology of basic igneous intrusives in the Martinsburg Formation, Lebanon County, Pennsylvania: *Pennsylvania Acad. Sci. Proc.*, v. 38, no. 2, p. 161-164, illus., **1965**. The major rock is quartz-bearing diabase. Alteration, considerably more extensive than in many Triassic diabases, partially obscures original textures and compositions. Amphibolitization, chloritization, sericitization, and serpentinization are recognized.
2. A method for determining post-depositional alteration in underclays and associated lithologies [Clearfield County]: *Pennsylvania Geol. Survey*, 4th ser. Inf. Circ. 57, 14 p., illus., **1967**. Underclay from below the Upper Freeport Coal in Clearfield County is used as an example to develop criteria for distinguishing between sediments which have undergone post-depositional alteration and those which are essentially unaltered.

JASTER, MARION CHARLOTTE, *see* Rogers, Cleaves Lincoln, 1.

JENKINS, H. E., *see* Ash, Simon Harry, 1.

JENNINGS, DAVID S., *see* Epstein, Anita G., 1.

JENNINGS, OTTO EMERY, 1877-1964.

1. Further notes on the plant geography of western Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 3, p. 42, **1929**. The distribution of certain trees in the area is shown to be controlled in part by geologic factors. Glaciation and accompanying soil variations are especially evident.

JENSEN, DAVID EDWARD.

1. Memorial of Harold Lattimore Alling [1888-1960]: Am. Mineralogist, v. 46, nos. 3-4, p. 470-474, port., **1961**.

JENSEN, MEAD LEROY, *see* Smitheringale, William George, 2.

JESPERSEN, ANNA.

1. Memorial to Jewell Jeannette Glass (1889-1966): Geol. Soc. America Proc. 1966, p. 225-227, port., **1968**.

JOBLING, J. J.

1. The origin of shale chip deposits in southeastern Centre County, Pa.; MS Thesis, Pennsylvania State Univ., **1969**.

JOHANNSEN, ALBERT, 1874-1962.

1. The serpentines of Harford County, Maryland: Maryland Geol. Survey [Rept.] 12, p. 195-287, illus., **1929**. A general petrographic description of the rocks includes a discussion of those in Northampton County and in southeastern Pennsylvania. Several types and possible origins are recognized.

JOHNSON, ARVID M., *see also* Williams, Eugene Griffin, 9.

1. (and Bergenback, Richard Edward). Mechanics of slumping in the Kittanning Formation, Clearfield County, Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 73, p. 180, **1963**.

JOHNSON, G. C.

1. (and Kirkaldie, Louis, and Page, R. C.). Method used by the Soil Conservation Service to estimate erosion and sedimentation rates in the Susquehanna River Basin [abs.]: Pennsylvania Acad. Sci. Proc. 1968, v. 42, p. 14, **1969**.

JOHNSON, HELGI.

1. (and Fox, Stephen Knowlton, Jr.). Dipleurozoa from Lower Silurian of [Monroe County] North America: Science, v. 162, no. 3849 p. 119-120, illus., **1968**. *Rutgersella truexi*, *R. delawarensis*, and *R. kittatinnyensis* from the Shawangunk Formation (Tuscarora) are described and illustrated.

JOHNSON, JOHN GRANVILLE, *see also* Boucot, Arthur James, 3, 4, 5, 6.

1. Some North American rensselandiid brachiopods: Jour. Paleontology, v. 43, no. 3, p. 829-837, illus., 1969. A general survey and discussion of the group includes descriptions and illustrations of *Subrensselandia claypoli* from the Montebello Sandstone in Perry and Schuylkill Counties.

JOHNSON, JESSE HARLAN.

1. Review of Ordovician algae, in Studies of Ordovician algae: Colorado School Mines Quart., v. 56, no. 2, p. 3-101, illus., 1961. *Anomalophycus compactus*, from Upper Cambrian rocks in Northampton County, is illustrated and discussed.

JOHNSON, KAREN, *see* Hartline, Dan, 1.

JOHNSON, KENNETH GEORGE, *see* Friedman, Gerald Manfred, 1.

JOHNSON, LEON JOSEPH.

1. (and Matelski, Roy P., and Engle, Carl F.). Clay mineral characterization of modal soil profiles in several Pennsylvania counties: Soil Sci. Soc. America Proc., v. 27, no. 5, p. 568-572, illus., 1963. Differences in distribution of clay types between profiles of the same soil type are detected, and it is concluded that soil correlation with clay mineral data is helpful but only of restricted application. Soils from Clinton, Columbia, Lehigh and Susquehanna Counties are included.
2. Occurrence of regularly interstratified chlorite-vermiculite as a weathering product of chlorite in a soil [Adams County]: Am. Mineralogist, v. 49, nos. 5-6, p. 556-572, illus., 1964. Details of the clay in the Highfield channery silt loam soil profile are given. The parent rock is greenstone composed of chlorite epidote, albite, and ilmenite.

JOHNSON, ROBERT WILLIAM, JR., *see* Henderson, John Richard, Sr., 1.

JOHNSTON, HERBERT E., *see also* Wood, Perry Rowley, 1.

1. Hydrology of the New Oxford Formation in Lancaster County, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. W 23, 80 p., illus. incl. geol. maps, 1966. The various units within the formation are discussed and their water-bearing properties described. Water occurs chiefly in joints and in intergranular openings in weathered rock bordering the joints. Analyses are included.

JOLLY, JANICE LAURENE WILLARD.

1. (and Heyl, Allen Van, Jr.). Mercury and other trace elements in sphalerite and wallrocks from central Kentucky, Tennessee, and Appalachian zinc districts: U. S. Geol. Survey Bull. 1252F, p. F1-F29, illus., 1969. Spectrographic analyses show 15,000 ppb Hg in sphalerite from the Bamford Mine in Lancaster County, 5,000 ppb in the ore from the Almedia Mine in Columbia County, and 20,000 ppb in the ore from the Wheatley Mine in Chester County. Other elemental analyses for the latter location are included.

JONES, BENJAMIN L.

1. Sedimentation and land use in Corey Creek and Elk Run basins [Tioga County] Pennsylvania (a progress report): U. S. Geol. Survey Repts. Open File, 132 p., illus., **1964**. [not seen].
2. Effects of agricultural conservation practices on the hydrology of Corey Creek basin, [Tioga County] Pennsylvania, 1954-60: U. S. Geol. Survey Water-Supply Paper 1532C, p. C1-C55, illus., **1966**. The basin is in Devonian and Mississippian rocks, and the influence of the rocks, topography, and other factors on sedimentation in the stream is shown.

JONES, EVERETTE BRUCE, *see* Dutcher, Russell Richardson, 1, 2.

JONES, MICHAEL LINDSEY.

1. (and Clendening, John A.). A feasibility study for paleocurrent analysis in lutaceous Monongahela-Dunkard strata of the Appalachian basin: West Virginia Acad. Sci. Proc. 1968, v. 40, p. 255-261, illus., **1968**. A partially computerized statistical analysis of ostracod orientations for seven sample sites (two of which are in Washington County) show a general northerly direction of paleocurrent flow.

JOYNER, WILLIAM B.

1. Heat flow in [western] Pennsylvania and West Virginia: Geophysics, v. 25, no. 6, p. 1229-1241, illus., **1960**. Measurements from wells in Potter and Butler Counties show that the heat flow varies from 1.1 to 1.5 microcal/cm². More important, it demonstrates the feasibility of getting heat-flow values accurate to better than 25 percent by extending thermal resistivities from well-sample logs.

JUDSON, S. SHELDON, JR., *see also* Richards, Horace Gardiner, 4.

1. William Morris Davis [1850-1934]—An appraisal: Zeitschr. Geomorphologie, new ser. v. 4, nos. 3-4, p. 193-201, port., **1960**.
2. William Morris Davis [1850-1934]—An appraisal, *in* The physical geography of William Morris Davis—lecture notes (1927-1929) and collected drawings: Privately printed, p. 4-11, **1962**.
3. (and Ritter, Dale Franklin). Rates of regional denudation in the United States: Jour. Geophys. Research, v. 49, no. 16, p. 3395-3401, illus., **1964**. Most of Pennsylvania is in the North Atlantic drainage province and the erosion rate, in inches/1,000 years is: Delaware River 0.8, Schuylkill 2.7, and Juniata 0.5. The western portion is in the Mississippi drainage area whose total is 1.3, but the Pennsylvania rivers are not separated.

KAMMERER, JOHN CRAIG, *see* Graham, Jack Bennett, 2.

KANE, MARTIN FRANCIS.

1. Structure of plutons from gravity measurements [Bucks County], *in* Geological Survey research 1961: U. S. Geol. Survey Prof. Paper 424 C, p. C258-C259, illus., **1961**. A diabase sill forming Solisbury Mountain is

best matched to computed values of a sill dipping 20° and extending to ½ mile in depth. A rough estimate of the angle of dip can be obtained by an inspection of the profile. The contacts can be located also from the curves.

KARROW, PAUL FREDERICK, *see* Goldthwait, Richard Parker, 1.

KAUFFMAN, MARVIN EARL, *see also* Campbell, Lyle D., 1; Wise, Donald Underkoffler, 6.

1. Piedmont stratigraphy near the Susquehanna River, *in* Some tectonic and structural problems of the Appalachian Piedmont along the Susquehanna River—Field Conf. Pennsylvania Geologists, 25th: Lancaster, Franklin and Marshall College, p. 23-26, **1960**. An outline of the rocks of the region is given. They range in age from Precambrian to Triassic.
2. Stratigraphic relations of the Glenarm Series [southeastern Pennsylvania], *in* Some tectonic and structural problems of the Appalachian Piedmont along the Susquehanna River—Field Conf. Pennsylvania Geologists, 25th: Lancaster, Franklin and Marshall College, p. 49-52, **1960**. Evidence is reviewed for the various ages of the Glenarm Series. Precambrian, Cambro-Ordovician, and pre-Silurian ages have all been proposed.
3. (and Campbell, Lyle D.). Revised interpretation of the Cambrian Kinzers Formation in southeastern Pennsylvania [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 1, p. 32-33, **1969**.

KEHN, THOMAS MATHEW, *see also* Wood, Gordon Harry, Jr., 1, 6, 8, 9, 14.

1. Previously unrecognized Devonian rocks and a major fault between the Schuylkill and the Susquehanna River [northeastern] Pennsylvania [abs.]: Geol. Soc. America Bull., v. 71, no. 12, p. 2018-2019, **1960**.
2. (and Glick, Ernest Earwood, and Culbertson, William Craven). Geology of the Ransom Quadrangle, Lackawanna, Luzerne, and Wyoming Counties, Pennsylvania: U. S. Geol. Survey Bull. 1213, 81 p., illus. incl. geol. map, **1966**. A complete geological description of the area is given. Devonian-Pennsylvanian rocks are described. Pleistocene deposits occur as river terraces. The gently folded White Deer anticline is the predominant structure. Anthracite coal is present, and a few gas shows are noted. Sand and gravel occur in the flood plain and river terraces.

KEIGHTON, WALTER BARKER, JR., *see* McCarren, Edward F., 3; Olmsted, Franklin Howard, 1; Parker, Gerald Gordon, 1.

KEITH, MACKENZIE, LAWRENCE, *see also* Dahlberg, Eric Charles, 4; Weber, Jon Noel Earl, 2, 5; Williams, Eugene Griffin, 5.

1. (and Weber, Jon Noel Earl). Carbon and oxygen isotope composition of selected limestones and fossils: Geochim. et Cosmochim. Acta, v. 28, no. 11, p. 1787-1816, illus., **1964**. Ordovician, Devonian, and Pennsylvanian limestones are analyzed with many others from other places, to demonstrate that the C and O isotope ratios provide significant but not infallible criteria of depositional environments.

2. (and Cruft, Edgar Frank, and Dahlberg, Eric Charles). Trace metals in stream sediment of southeastern Pennsylvania—Part 1, Geochemical prospecting guide based on regional distribution of zinc, copper, nickel, cobalt, chromium, and vanadium: Pennsylvania State Univ. Earth and Mineral Sci. Exper. Sta. Bull. 82, 14 p., illus., 1967. Spectrographic analysis of stream sediments for trace metals resulted in the recognition of numerous metalliferous regions which reflect sources of the various metals from soils, plants, and ore bodies.

KELLER, ALLEN.

1. Partial section of Wissahickon Schist, Wissahickon Creek [Philadelphia County]: Pennsylvania Acad. Sci. Proc., v. 37, p. 300-303, illus., 1963. Quartzite, quartzite and schist interbedded, and schist occur homoclinally between two anthophyllite sills. Repeated, reversed sequences suggest the 400-foot-thick section is in an isoclinally folded anticline.

KELLER, GEORGE VERNON, *see* Anderson, Lennart A., 1.

KELLEY, DANA ROBINEAU, *see also* Lytle, William Stuckley, 17.

1. The Kastle Medina gas field, Crawford County, *in* Oil and gas developments in Pennsylvania 1965: Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 172, p. 30-44, illus., 1966. Fifty-two wells are into the Silurian Medina Sandstone in stratigraphic-trap type reservoirs. Various sandstone units are present and produce gas. Small-scale isopach maps are included.
2. Geology of the Red Valley Sandstone in Forest and Venango Counties, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. M 57, 49 p., illus., 1967. Basin type gray siltstones and shales grade into narrow nearshore belts of clean, porous sand. Shelfward from the belts the sandstones are more laminated and cemented, and farthest shelfward the zone breaks into sandstone, siltstone, and shale. Predictable Upper Devonian transgression and regression are present, and petrographic characteristics are useful in determining economic potential.
3. Relationship of geology and production in the Red Valley and Venango Sandstones, middle producing district, Pennsylvania: Producers Monthly, v. 31, no. 3, p. 10-17, illus., 1967. Petrographic studies and geological relations of the two sands show that the facies relationship and the amount and type of pore-plugging fines, secondary silica, and carbonate and clay cements vary vertically and horizontally. The variations are predictable and potentially of very economic importance.
4. (and McGlade, William George). Medina and Oriskany production along the shore of Lake Erie, Pierce Field, Erie County, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. M 60, 38 p., illus., 1969. Gas is derived from a northward trending belt of well-developed, multiple, fine-grained, Medina sandstones and a similar trending belt or medium-grained Oriskany sands. Both are strand-line beach or bar developments. The Medina pool in the Pierce Field is a stratigraphic trap whereas the Oriskany pool is a structural-stratigraphic trap. Other horizons are potential reservoirs also.

5. (and Lytle, William Stuckley, and Wagner, Walter Richard, and Heyman, Louis). Oil and gas developments in Pennsylvania in 1968: Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 177, 48 p., illus., 1969.

KELLEY, R., *see* White, William Blaine, 7.

KELLY, GEORGE F.

1. United States section of petroleum geologic map of North America: Tulsa, Oklahoma, privately printed, 2 sheets, scales, 1:6,000,000, and 1:2,500,000, [1960?]. [not seen].

KENNEDY DONALD O., *see* Ash, Simon Harry, 4.

KENT, BION HUNTLEY, *see also* Roen, John B., 1.

1. (and Roen, John B., and Schweinfurth, Stanley Paul). Field Trip 1, Stratigraphy of Upper Pennsylvanian and Lower Permian rocks, Washington County, Pennsylvania, with a section of the Pleistocene Carmichaels Formation, *in* Stratigraphy of the Pennsylvanian and Permian rocks of Washington, Mercer, and Lawrence Counties, Pa.—Field Conf. Pennsylvania Geologists, 30th.: Harrisburg, Pennsylvania Bur. Topog. and Geol. Survey and U. S. Geol. Survey, p. 1-47, illus., 1965. A field trip of 84 miles makes 6 stops, all in Pennsylvanian and Permian rocks, where a case is made for new stratigraphic classification. Each stop is extensively described. One stop, at Speers, is allotted to the Carmichaels Formation.
2. Geologic map [and sections] of the Hackett Quadrangle, Washington County, Pennsylvania: U. S. Geol. Survey Quad. Maps of the U. S., Map GQ 630, scale, 1:24,000, text, 1967. Only Pennsylvanian, Permian, and Quaternary Formations are present; structure contours at the base of the Pittsburgh coal show gentle undulations to be present. Coal is the chief resource. Oil and gas have been won locally, and various types of stone are reported.
3. Experiments with storage, retrieval, and analyses of core-log data on coal-bearing rocks in southwestern Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 101, p. 109, 1968.
4. Geologic map of part of the Carmichaels Quadrangle [Fayette, Greene, and Washington Counties], southwestern Pennsylvania: U. S. Geol. Survey Misc. Geol. Invs. Map I 588, scale, 1:24,000, text, 1969. The areas along the left bank of the Monongahela River are mapped. Pennsylvanian-Permian rocks are present, as is Quaternary alluvium. Structure contours on the base of the Pittsburgh coal bed are included. Coal, oil and gas, stone, and clay are the mineral deposits present.
5. Geologic map of the Mather Quadrangle [Fayette, Greene, and Washington Counties], southwestern Pennsylvania: U. S. Geol. Survey Geol. Atlas of the U. S., Map GQ 826, scale, 1:24,000, text, 1969. Pennsylvanian, Permian, and Quaternary rocks are mapped. The rocks are essentially unfolded. A structure contour map on the Pittsburgh coal

bed is included. Coal and clay are the chief mineral resources. Some gas and stone also are present.

6. The geologic setting of a Pittsburgh coal mine in [Greene County] southwestern Pennsylvania [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 7, p. 122, **1969**.
7. (and Schweinfurth, Stanley Paul, and Roen, John B.). Geology and land use in eastern Washington County, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. 56, 31 p., illus. incl. geol. map, **1969**. Aspects of composition, structure, and present condition of bedrock in Hackett and Ellsworth Quadrangles are discussed in relation to the use of the land and land-use planning, with a view toward the expansion of metropolitan Pittsburgh into the area. Emphasis is upon engineering and hydrologic properties.
8. Methods of storing and retrieving core-log data on coalbearing rocks in southwestern Pennsylvania, in Geological Survey research 1969: U. S. Survey Prof. Paper 650 C, p. C166-C173, illus., **1969**. Examples of a computer based storage and retrieval system for data about Pennsylvanian and Permian rocks from Greene and Fayette Counties are given. Both the code and the card-file system are expandable.

KEROHER, GRACE CABLE.

1. Glossary of stratigraphic terms in Upper Paleozoic floral zones and floral provinces of the United States: U. S. Geol. Survey Prof. Paper 454K, p. K19-K32, **1964**. An alphabetical listing includes many from the commonwealth. Geographic distribution, a brief physical description, and bibliography are included for each of the terms listed.

KERR, JAMES R.

1. The mineral industry of Pennsylvania in 1963: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 53, 42 p., **1965**; reprinted from U. S. Bur. Mines Minerals Yearbook 1963, v. 3, p. 909-950, illus., **1964**.
2. The mineral industry of Pennsylvania in 1964: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 55, 46 p., **1966**; reprinted from U. S. Bur. Mines Yearbook 1964, v. 3, p. 845-890, illus., **1965**.
3. (and Rand, Lenox Hawes, and Vallely, James L.). The sulfur and sulfuric acid industry of eastern United States: U. S. Bur. Mines Inf. Circ. 8255, 92 p., illus., **1965**. A general survey of the industry includes a brief description of sulphide deposits in southeastern and western Pennsylvania. Some comes from sour natural gas and the rest from sulphide metal deposits, chiefly from Cornwall in Lebanon County.

KESLING, ROBERT VERNON.

1. (and Paul, Christopher R. C.). New species of Porocrinidae and brief remarks upon these unusual crinoids: Michigan Univ. Mus. Paleontology Contrib., v. 22, no. 1, p. 1-32, illus., **1968**. *Triboloporus xystrotus*, new from the Ordovician Chambersburg Limestone in Franklin County is described and illustrated.

KHARKAR, D. P.

1. (and Turekian, Karl Karckin, and Bertine, Kathe K.). Stream supply of dissolved silver, molybdenum, antimony, selenium, chromium, cobalt, rubidium, and cesium to the oceans: *Geochim. et Cosmochim. Acta*, v. 32, no. 3, p. 285-298, illus., **1968**. Analyses of water from the Susquehanna River are included. It contained 186 mg/l dissolved solids total, and trace amounts of all the elements sought were present.

KIMBERLIN, JEROME, *see* Wasson, John Taylor, 1.

KIMMEL, GRANT E.

1. (and Schiner, George R.). Progress report on the groundwater conditions of the Shenango and Stoneboro 15-minute quadrangles [Crawford and Mercer Counties], Pennsylvania: U. S. Geol. Survey Repts. Open File, 167 p., illus., **1967**. [not seen].
2. (and Schiner, George R.) Progress report on the groundwater conditions of the Shenango and Stoneboro 15-minute quadrangles [Crawford and Mercer Counties], Pennsylvania: U. S. Geol. Survey Repts. Open File, 167, p., illus., **1968**. [not seen].

KING, ELIZABETH RAYMOND, *see* Zietz, Isidore, 2.

KING, LEWIS H.

1. (and Goodspeed, Francis E., and Montgomery, Douglas Sargent). A study of sedimented organic matter [Washington County] and its natural derivatives: Canada Mines Branch, Dept. Mines and Tech. Surveys Research Rept. R114, 68 p., illus., **1963**. Albertite vein material, considered epigenetic from the Monongahela Formation, is cited along with many others from elsewhere. A classification of such material, based on origin, chemistry, and textures, is proposed.

KING, PHILIP BURKE.

1. Systematic pattern of Triassic dikes in the Appalachian region, *in* Geological Survey research 1961: U. S. Geol. Survey Prof. Paper 424 B, p. B93-B95, illus., **1961**. The patterns of the Triassic dikes are manifestations of the regional stress patterns of the time, and probably reflect the deep-seated tensile stresses that existed during Late Triassic time.
2. The tectonic map of North America [text and legend]: Washington, D. C., U. S. Geol. Survey, 26 p., 1964; *in* Scientific Communications read to the Commission for the Geological Map of the World: Paris, Internatl. Geol. Cong., p. 17-31, **1966**. Generalized descriptions of some of the major features are included.
3. Tectonics of Quaternary time in Middle North America, *in* Quaternary of the United States: Princeton, New Jersey, Princeton Univ. Press, p. 831-870, illus., **1965**. A summary of tectonic events includes a small-scale map of earthquake epicenters showing southeastern Pennsylvania to be the most active portion, and the northwest part of the state less so. The central part has been remarkably stable. Postglacial emergence begins along a line which passes through northeastern Pennsylvania.

4. Tectonic map of North America: Washington, D. C., U. S. Geol. Survey, scale, 1:5,000,000, **1969**.
5. The tectonics of North America—a discussion to accompany the Tectonic map of North America, scale, 1:5,000,000: U. S. Geol. Survey Prof. Paper 628, 94 p., illus., **1969**. Detailed descriptions of structural areas includes some of those in Pennsylvania. Included is the Appalachian Fold Belt.

KING, R. F., *see* Opdyke, Neil D., 1.

KINKEL, ARTHUR RUDOLPH, JR.

1. (and Peterson, Nels Paul). Copper in the United States, exclusive of Alaska and Hawaii: U. S. Geol. Survey Mineral Invs. Resource Map MR-13, scale, 1:3,168,000, separate text, **1962**. Copper is reported from Lebanon and Lancaster Counties as by-products of other mineral deposits.

KIRKALDIE, LOUIS, *see* Johnson, G. C., 1.

KIRKBY, ANNE V. T.

1. Boulder fields on Bald Eagle Mountain [central] Pennsylvania [abs.]: Assoc. Am. Geographers Annals, v. 55, no. 4, p. 626, **1965**.

KIRKWOOD, SAMUEL, *see* Swain, Frederick Morrill, Jr., 6, 7.

KIRSIPER, THEODORE V., *see* Holland, Heinrich Dieter, 2.

KJELLESVIG-WAERING, ERIK N.

1. Revision of some Upper Devonian Stylonuridea (Eurypterida) from New York and [Wyoming County] Pennsylvania: Jour. Paleontology, v. 37, no. 2, p. 490-495, **1963**. *Hallipterus laeoanus* (Claypole) a eurypterid, from the Upper Devonian Catskill Formation in Wyoming County is described. It has been known heretofore as *Ctenopterus laeoana*.
2. A revision of the families and genera of the Stylonuracea (Eurypterida): Fieldiana—Geology, v. 14, no. 9, p. 169-197, illus., **1966**. Included are nomenclatural revisions of *Stylonurus shaffneri*, Devonian; *Stylonurella arnoldi*, Devonian; *Parastylonurus beecheri*, Devonian; *P. myops*, Silurian; *Hallipterus laeoanus*, Devonian; and *Hibbertopterus patens*, Pennsylvanian.

KLEIN, GEORGE deVRIES.

1. Observation of modern flute mark formation in a quarry delta [Bedford County] [abs.]: Geol. Soc. America Spec. Paper 87, p. 89, **1966**.
2. Deposition of Triassic sedimentary rocks in separate basins, eastern North America: Geol. Soc. America Bull., v. 80, no. 9, p. 1825-1832, illus., **1969**. K-Ar measurement of the Triassic rocks and source rocks show that the New Jersey [and southeastern Pennsylvania] basin was isolated from the Connecticut Basin. Paleocurrent analyses of the other Triassic basins of eastern North America confirms that each was a separate basin at the time of deposition.

KLEMIC, HARRY, *see also* McKnight, Edwin Thor, 2; Stern, Thomas Whital, 1.

1. Uranium occurrences in sedimentary rocks of Pennsylvania: U. S. Geol. Survey Bull. 1107D, p. 243-288, illus., **1962**. Uranium occurrences in rocks of Devonian to Triassic age from many places in the state are described. None is commercial, and all are in sedimentary rocks. Analyses are included.
2. (and Warman, James C., and Taylor, Alfred Raleigh). Geology and uranium occurrences, of the northern half of the Lehigh, Pennsylvania Quadrangle and adjoining areas: U. S. Geol. Survey Bull. 1138, 97 p., illus. incl. geol. map, **1963**. Devonian to Mississippian rocks are present and folded. Uranium occurs in the Cherry Ridge Member of the Catskill Formation. The uranium occurs disseminated in the rock near joints and is thought to be concentrated epigenetically from uranium that was deposited syngenetically in the Devonian rocks. The age is 115 to 135 my. Some may be economic.

KNIGHT, JAMES BROOKES, 1888-1960.

1. Paleozoic gastropod genotypes: Geol. Soc. America Spec. Paper 32, 510 p., illus., **1941**. *Sphaerodoma primogenia* from the Pennsylvanian Brush Creek Limestone in Cambria County, is described and illustrated.

KNIGHT, WILLIAM VICTOR.

1. Historical and economic geology of Lower Silurian Clinton Sandstone of northeastern Ohio: Am. Assoc. Petroleum Geologists Bull., v. 53, no. 7, p. 1421-1452, illus., **1969**. Some of northwestern Pennsylvania is also included in a regional evaluation of the unit. Small-scale cross-sections and lithofacies maps are included. The sediments were deposited in small deltas along the eastern shore of a shallow sea in a relatively arid climate.

KNOPF, ADOLPH, 1882-1966.

1. Louis Valentine Pirsson, November 3, 1860-December 8, 1919: Natl. Acad. Sci. Biog. Mem., v. 34, p. 228-248, port., **1960**.

KNOWLES, RAYMOND ROBERT.

1. Geology of the Bedford-Everett-Saxton area, Bedford County, Pennsylvania: PhD Thesis, Pennsylvania State Univ., **1964**; [abs.], Dissert. Abs., v. 26, no. 2, p. 985, **1965**.
2. Geology of a portion of the Everett 15-minute quadrangle, Bedford County, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 170, 90 p., illus. incl. geol. map, **1966**. Cambrian-Devonian rocks are mapped in an area diagonally from the northeast to the southwest corner of the quadrangle. Anticlines and synclines are the predominant structures, and thrust faulting is also present.
3. (and Opdyke, Neil D.). Paleomagnetic results from the Mauch Chunk Formation—A test of the origin of the curvature in the folded Appalachians of Pennsylvania: Jour. Geophys. Research, v. 73, no. 20, p. 6515-6526, illus., **1968**. The directions of demagnetization from 25 sites were found to be the same around the curve of the Appalachians, apparently ruling out their horizontal rotation after acquisition of their stable magnetism.

KOHLAND, WILLIAM FRANCIS.

1. Soils of Erie and Jefferson Counties, Pennsylvania—A geographic study and comparison of soils in a glaciated and a non-glaciated area: PhD Thesis, Univ. Tennessee, **1969**.

KOHMAN, TRUMAN PAUL, *see* Lefelhocz, John F., 1.

KOMAR, C. A.

1. (and Pierce, Clyde I.). Acoustic velocities in oil reservoir formations from laboratory and field measurements: *Producers Monthly*, v. 29, no. 2, p. 8, 10-12, illus., **1965**. The Devonian Glade Sand, from a core in Warren County, is used with others from elsewhere to compare field tests with laboratory tests of oil-bearing sands. Acoustic characters of Appalachian sands vary widely.

KONIKOW, L. F.

1. Mountain runoff and its relation to precipitation, ground water, and re-charge to the earbonate aquifers of Nittany Valley, [Centre County] Pennsylvania: MS Thesis, Pennsylvania State Univ., **1969**.

KOPPE, EDWIN FREDERICK, *see also* Edmunds, William E., 1.

1. Coal—A petrographic approach: Pennsylvania Geol. Survey, 4th ser. Bull. M 42, 35 p., illus., **1960**. An exposition of coal petrography is offered, showing its potential value to coal research and utilization. Nomenclature and techniques are included as are numerous examples from the state.
2. Some geological factors affecting the Upper Freeport Coal [southwestern Pennsylvania] and its quality: *Am. Inst. Mining, Metallurgical, and Petroleum Engineers Trans.* 1960, v. 217, p. 185-189, illus., **1961**; reprinted as *Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 159*, **1961**. The presence or absence of a sandstone roof, sandstone rolls, and bony coal at the top, and the presence or absence of basal partings are related to the original topography of the coal-swamp area, and in turn influence the nature and quality of the coal.
3. Coastal swamps and Pennsylvania coal strata [abs.]: *Pennsylvania Acad. Sci. Proc.*, v. 36, p. 292, **1962**.
4. Petrography of the Upper Freeport coal—Harmar and Springdale mines, Allegheny and Westmoreland Counties, Pennsylvania: *Pennsylvania Geol. Survey, 4th ser. Bull. M 48*, 43 p., illus., **1963**. Individual coal layers within the bed show little lateral change and have uniform concentrations of vitrinoids and other macerals. Megascopic variations are due to size variation of ingredients, and not chemical differences.
5. Petrographic continuity of [Clearfield County] Pennsylvania coals, [Chapter] 6 in *Coal science—Advances in Chemistry*, v. 55: Washington, D. C., Am. Chem. Soc., p. 69-78, illus., **1966**; discussion, p. 79. Studies in the Upper Freeport coal in the Houtzdale Quadrangle, and elsewhere show that petrographic composition of the coal can be related to the geological setting during the formation. Good lateral continuity occurs in many directions but is "poor" across structures.

6. Petrography of coal in the Houtzdale Quadrangle, Clearfield County, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull M 55, 73 p., illus., **1967**. Data for 9 coals from 92 sample sites are given. Conemaugh coals and the Mercer coal have low vitrinoid values and high ash, and are marginally economic. The Allegheny coals have high vitrinoid values and are commercially valuable. Petrography helps identify coals over distances over 4 miles; the Upper Freeport and some beds in the Lower Kittanning coals are readily identified.

KOSCHMANN, ALBERT HERBERT.

1. (and Bergendahl, Maximilian Hilmar). Gold in the United States, exclusive of Alaska and Hawaii: U. S. Geol. Survey Mineral Invs. Resource Map MR-24, scale, 1:3,168,000, separate text, **1962**. Gold in Pennsylvania comes only as a by-product from the Cornwall, Lebanon County, iron deposits.
2. (and Bergendahl, Maximilian Hilmar). Principal gold-producing districts of the United States: U. S. Geol. Survey Prof. Paper 610, 283 p., illus., **1968**. Gold from Pennsylvania has occurred in significant quantities only in the Cornwall Mine in Lebanon County. The gold occurs with the chalcopyrite ores.

KOVACH, ROBERT L., *see* Oliver, Jack Ertle, 1.

KOVAR, ANTON J.

1. Pollen analysis of the Bear Meadows bog of [Centre County] central Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 38, no. 2, p. 16-24, illus., **1965**. Pollen from a 9½ foot-long core show a diversified forest in the area from the very bottom. The spruce maximum is absent. The age of the bottom is 10,320 years so that during the Valdres readvance, a forest was entrenched in the area.

KRAFT, JOHN CHRISTIAN, *see* Swain, Frederick Morrill, Jr., 4.

KRALL, DUTCH.

1. Guthville Cave, Lehigh County: Nittany Grotto News, v. 11, no. 1, p. 11, illus., **1962**.
2. Longenecker Cave, Lebanon County: Nittany Grotto News, v. 10, no. 7, p. 128-129, illus., **1962**.

KRAUSE, EDWARD HENRY.

1. Albert E. Foote [1846-1895], M.D., naturalist: Earth Sci., v. 14, no. 2, p. 65-68, 78, port., **1961**.

KREIDLER, WILLIAM LYNN.

1. Selected deep wells and areas of gas production in western New York [and northwestern Pennsylvania]: New York State Mus. and Sci. Service Bull. 390, 404 p., illus., **1963**. Data from fifty-five wells from Erie County, 84 from Potter County, 16 from Warren County, 16 from McKean County, and 5 from Crawford County are included. The depths to tops of various Paleozoic formations are included. Some penetrate to the Cambrian.

KRUMBEIN, WILLIAM CHRISTIAN, *see also* Sloss, Laurence Louis, 1.

1. J[oseph] P[oyer] D[eyo] Hull (1889-1967) and the SEPM—A tribute: Jour. Paleontology, v. 41, no. 6, p. 1542-1543, port., 1967.

KULLERUD, GUNNAR.

1. Memorial of Hugh Richard Gault [1915-1961]: Am. Mineralogist, v. 37, nos. 3-4, p. 444-449, port., 1962.

KULP, JOHN LAURENCE, *see* Ault, Wayne Urban, 1, 2; Fanale, Fraser Partington, 1, 2, 3; Long, Leon Eugene, 1, 2.

KUO, JOHN TSUNG FEN.

1. (and Jackens, R. C., and White, G., and Ewing, William Maurice). A transcontinental tidal gravity profile across the United States [including Carlisle, Cumberland County] [abs.]: EOS, v. 50, no. 4, p. 116, 1969.

KUPFER, DONALD HARRY.

1. A proposed deformation diagram for the analysis of fractures and folds in orogenic belts: Internatl. Geol. Cong., 23rd, Proc. Sec. 13, p. 219-232, illus., 1968. The Appalachian tectonic realm, which includes western Pennsylvania, is used as one of several examples to demonstrate a new descriptive technique to replace the strain ellipsoid.

KURTÉN, BJÖRN.

1. Pleistocene bears of North America, [Part] 2, Genus *Arctodus*, short-faced bears: Acta Zool. Fennica 117, 60 p., illus., 1967. A review of the genus includes discussions and descriptions of *Arctodus pristinus* from the Port Kennedy Cave in Montgomery County and *A. simus* from the Frankstown Cave, Blair County.

KYNOR, H. D., *see* Ash, Simon Harry, 3.

LACEY, JAMES EDWARD.

1. Cyclic sedimentation in the Silurian Wills Creek and Tonoloway Formations at Mt. Union [Huntingdon County] Pennsylvania: MS Thesis, Univ. Pittsburgh, 1960.

LAHMAN, HOWARD S.

1. (and Orange, Arnold, and Vozoff, Kceva). Deep resistivity investigations in the continental United States—U. S. Air Force Cambridge Research Labs., Contract AF19(628)-2351, Sci. Rept. 8, (Final Rept.) (AFCRL 66-28): Cambridge, Mass., Geoscience Inc., 60 p., illus., 1965. Resistivity characteristics of Precambrian rocks from southeastern Pennsylvania and elsewhere were determined. None were greater than 105 ohms and wide variations resulted from structures which effected the bulk resistivity. One traverse was to the north from Pottstown and the other to the south. The interpretations of the variations can be explained by the fault which is mapped.

LAMPE, R. K.

1. James Dwight Dana [1813-1895]: *Earth Sci.*, v. 21, no. 3, p. 124-125, port., **1968**.

LAMPIRIS, NICHOLAS, *see* Epstein, Jack Burton, 3.

LANDER, JAMES FRENCH.

1. (and Cloud, William K.). *United States earthquakes 1961*: Washington, D. C., U. S. Coast and Geod. Survey, 106 p., illus., **1963**. The earthquake of September 14, 1961 is described. The epicenter was in the Lehigh Valley. Maximum intensity was V. Another on December 27 occurred on the Pennsylvania-New Jersey border. Its maximum intensity was also V.

LANDES, KENNETH KNIGHT.

1. Salt deposits of the United States, Chapter 5 of *Sodium chloride—The production and properties of salt and brine*: New York, Reinhold Publishing Corp., p. 70-95, illus., **1960**. A very cursory description of the occurrence of salt in the Silurian beds of western Pennsylvania is included.
2. *Metallurgical limestone reserves in the United States* (2nd edition): Washington, D. C., Natl. Lime Assoc., 31 p., illus., **1963**. Such stone occurs in Cambro-Ordovician limestones in central and southeastern Pennsylvania, and in the Pennsylvanian Vanport Limestone in the west. A map shows the distribution. No reserve figures are included.

LANDIS, CHARLES, JR., *see also* Turner, Thomas D., 1.

1. Bones from Hosterman Pit [Centre County]: *Nittany Grotto News*, v. 10, no. 2, p. 29-30, **1961**. Bones of ten mammal and 2 reptile species are listed from the cave. They are considered post-Pleistocene.
2. (and Smeltzer, Bernard L.). Preliminary map of addition to Arnold Cave, Freeburg, Snyder Co., Pa.: *Speleo Digest* 1959, p. 171, **1961**.

LANDON, RONALD ARTHUR.

1. The geology of the [Cambrian] Gatesburg Formation in the Bellefonte Quadrangle [Centre County] Pennsylvania and its relationship to the general occurrence and movement of ground water: MS Thesis, Pennsylvania State Univ., **1963**.
2. Influence of hydrogeology on stream and valley development in the Bellefonte Quadrangle [Centre County], Pennsylvania [abs.]: *Geol. Soc. America Spec. Paper* 82, p. 118-119, **1965**.

LANDY, RICHARD ALLEN.

1. Variation in chemical composition of rock bodies—Metabasalts in the Iron Springs Quadrangle, South Mountain, [Adams and Franklin Counties] Pennsylvania: PhD Thesis, Pennsylvania State Univ., **1961**; [abs.], *Dissert. Abs.* v. 22, no. 7, p. 2412-2413, **1962**.

LANE, B. E.

1. Sanitary land fill leachite interactions with a carbonate-rock derived soil in central Pennsylvania: MS Thesis, Pennsylvania State Univ., **1969**.

LANE, H. RICHARD.

1. (and Merrill, Glen Kenton, and Straka, Joseph J., 2d, and Webster, G. D.) North American Pennsylvanian conodont biostratigraphy [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 6, p. 28, **1969**.

LANG, SOLOMON MAX, *see* Barksdale, Henry Compton, 1.

LANGMIUR, DONALD.

1. The chemistry of ground and surface waters in Nittany Valley [Centre County]: Earth and Mineral Sci., v. 38, no. 9, p. 73-74, **1969**. Examples of some of the problems associated with water needs accompanying increased population are cited from the Penn State University area. Water chemistry is the key to understanding the resource.
2. Saturation with calcite and dolomite of some ground waters in folded and faulted carbonate rocks [Centre County] [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 7, p. 133-134, **1969**.

LAPHAM, DAVIS MORTIMER, *see also* Gray, Carlyle, 3; O'Neill, Bernard J., Jr., 2.

1. Geology of the Cedar Hill serpentine quarry [Lancaster County], in Some tectonic and structural problems of the Appalachian Piedmont along the Susquehanna River—Field Conf. Pennsylvania Geologists, 25th: Lancaster, Franklin and Marshall College, p. 33-38, **1960**. The occurrence of serpentine bodies in contact with schist is described. The serpentinite contact is parallel with the schistosity, and chlorite and talc are present at the contact, and the schist is gneissic at the contact. Igneous rocks lie nearby to the south, and all rocks are transected by pegmatites.
2. Photomicrography of the Cornwall magnetite ore body, Cornwall [Lebanon County] Pennsylvania [abs.]: Geol. Soc. America Bull., v. 71, no. 12, p. 1913, **1960**; Econ. Geology, v. 55, no. 6, p. 1334, **1960**.
3. New data on deweylite [Lancaster County]: Am. Mineralogist, v. 46, nos. 1-2, p. 168-188, illus., **1961**. Deweylite from the Cedar Hill quarry is examined by optical methods, chemical composition, differential thermal analysis, and by analysis of various structural data. Deweylite is indeed a member of the serpentine group, and is close to antigonite.
4. (and Geyer, Alan Raymond). Common rocks and minerals of Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Educ. Ser. no. 1, 22 p., illus., [**1962**]. This is a popular account of the nature and properties of common minerals and rocks with brief descriptions of occurrences of each within the state.
5. Geology from Easton [Lehigh County] to Lebanon [Lebanon County], April 15, 1962, in Northern field excursion guidebook—Internatl. Mineralog. Assoc., 3d Gen. Cong., Washington, D. C., 1962: [Washington, D. C., Mineralog. Soc. America], p. 28-31, illus., **1962**. Descriptions of geological exposures along the 82-mile route are included along with mileage notations.
6. Geology from Lebanon [Lebanon County] to Cedar Hill [Lancaster County], April 16, 1962, in Northern field excursion guidebook—Internatl. Mineralog. Assoc., 3d Gen. Cong., Washington, D. C., 1962: [Washington, D. C., Mineralog. Soc. America], p. 32-42, illus., **1962**. Details

of geological exposure along this 52-mile trip are included. Mileage values are given, as is a summary of the geology of the Cornwall iron deposit.

7. Geology of Cedar Hill [Lancaster County] serpentinite quarry, *in* Northern field excursion guidebook—Internatl. Mineralog. Assoc., 3d Gen. Cong., Washington, D. C., 1962; [Washington, D. C., Mineralog. Soc. America], p. 43-49, illus., 1962. The quarry at New Texas is a good example of serpentinitized ultramafic rocks and details of the geological setting, mineralogy, and petrography are included.
8. (and McKague, Herbert Lawrence). Deformation of serpentinites in the Piedmont of [southeastern] Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 73, p. 193-194, 1963.
9. Leonhardtite and laumontite in diabase from Dillsburg, [York County] Pennsylvania: Am. Mineralogist, v. 48, nos. 5-6, p. 683-689, 1963; correction, v. 49, nos. 1-2, p. 214, 1964. Optical, chemical, and X-ray data are accumulated. The minerals are associated with calcite, quartz, and other Na-Ca zeolites. Differences in X-ray data from previously reported measurements are given.
10. (and Bassett, William Akers). K-Ar dating of rocks and tectonic events in the Piedmont of [Lancaster County] southeastern Pennsylvania: Geol. Soc. America Bull., v. 75, no. 7, p. 661-667, illus., 1964; reprinted *in* Geological investigations in the Pennsylvania Piedmont: Pennsylvania Geol. Survey, 4th ser. Bull. G 46, 1964. Ultramafic intrusions and metamorphism occurred at least 460 my ago; apparent thrust slices at the Martie Line are older than 330 my; a regional metamorphism occurred about 330 my ago; and granitization of the Peters Creek Schist occurred 330 my ago or later.
11. (and McKague, Herbert Lawrence). Structural pattern associated with the serpentinites of [Chester and Lancaster Counties] southeastern Pennsylvania: Geol. Soc. America Bull., v. 75, no. 7, p. 639-659, illus. incl. geol. map, 1964; reprinted *in* Geological investigations of the Pennsylvania Piedmont: Pennsylvania Geol. Survey 4th ser. Bull. G 46, 1964. Shear and strike joints are more numerous in serpentinite than in adjacent schist, as are fractures more abundant and varied; schist-serpentinite contacts are commonly sheared. Other structural data, and these, indicate that two deformational patterns are younger than the final emplacement of the serpentinite (which was controlled by a pre-existing structural lineament).
12. (and Geyer, Alan Raymond). Mineral collecting in Pennsylvania (2nd edition): Pennsylvania Geol. Survey, 4th ser. Bull. G 33, 148 p., illus., 1965; originally published 1959; 3d ed., 164 p., 1969. A brief summary of the nature and origin of minerals is followed by a description of various mineral collecting locations.
13. A new nickeliferous magnesium hydroxide from Lancaster County, Pennsylvania: Am. Mineralogist, v. 50, no. 10, p. 1708-1716, illus., 1965. A nickeliferous polytype of brucite is described in detail. It is from the Cedar Hill quarry.
14. The tectonic history of multiply deformed serpentinite in the Piedmont of [Chester and Lancaster Counties] Pennsylvania, *in* Ultramafic and

related rocks: New York, John Wiley and Sons, p. 174-183, illus., **1967**. Micro- and macrostructural analyses of serpentinite from the State Line area and the regional schists reveal influence by orogenic forces from different directions and at different times. Regional structures are superimposed on the serpentinite, and stages of serpentinization can be related to successive deformations.

15. "Taconic" events in the [southeastern Pennsylvania] Piedmont—A preliminary identification [abs.]: Geol. Soc. America Spec. Paper 101, p. 265-266, **1968**.
16. Triassic magnetite and diabase at Cornwall, [Lebanon County] Pennsylvania, in *Ore deposits of the United States, 1933-1967*, vol. 1: New York, Am. Inst. Mining, Metallurgical, and Petroleum Engineers, p. 72-94, illus., **1968**. Magnetite ore, resulting from the invasion of limestone by diabase, originated by a high Eh- controlled partition and fractionation of iron and alkalis from a normal diabase magma before its intrusion. Much detail is included.

LAPORTE, LÉO FRÉDÉRIC, *see also* Head, James W., 3rd, 4.

1. Paleozoic carbonate facies of the central Appalachian shelf [abs.]: Am. Assoc. Petroleum Geologists Bull., v. 53, no. 3, p. 728, **1969**.

LARRABEE, DAVID MARCEL, *see also* Griffiths, Wallace Rush, 1.

1. Map [in three sheets] showing distribution of ultramafic and intrusive mafic rocks from northern New Jersey to eastern Alabama: U. S. Geol. Survey Misc. Geol. Invs. Map I 476, scale, 1:500,000, text, **1966**. Numerous bodies in southeastern Pennsylvania are included. Serpentine, gabbro, amphibolite, and hornblende gneiss and schist are present.

LATHRAM, ERNEST HARTWELL, *see* Hoare, Joseph McCormick, 1.

LATTMAN, LAURENCE HAROLD, *see also* Adler, Alan A., 1.

1. Technique of mapping geologic fracture traces and lineaments on aerial photographs: Photogram. Engineering, v. 24, no. 4, p. 568-576, illus., **1958**. Some examples from western Pennsylvania and elsewhere are used to show the ease of detection of subtle fracture traces which may be undetectable from the ground. Vegetation alignment, straight stream courses and soil tonal patterns are used.
2. Cross section of a floodplain in a moist region of moderate relief [Cambria County]: Jour. Sed. Petrology, v. 30, no. 2, p. 275-282, illus., **1960**. Drilling in Beaverdam Run for a damsite, showed deposits of vertical accretion, lateral accretion, lag deposits, channel fill, and colluvium fill the valley of an aggrading stream. The various types of material are described and nature of occurrence explained.
3. (and Matzke, Richard H.). Relationship between fracture trace and joint orientations in Centre County, Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 69, p. 216, **1962**.
4. Geologic interpretation of airborne infrared imagery, in *Proceedings of the second symposium on remote sensing of environment*: Ann Arbor, Michigan Univ. Inst. Sci. and Technology, Infrared Lab, p. 289-293,

illus., **1963**; Photogram. Engineering, v. 29, no. 1, p. 83-97, illus., **1963**. Infrared photographs of Mt. Nittany, in Centre County, are used as examples in demonstrating the infrared technique. Many geologic features become evident which cannot otherwise be easily detected on the ground or by conventional aerial photography.

5. (and Parizek, Richard Rudolph). Relationship between fracture traces and the occurrence of ground water in carbonate rocks [central Pennsylvania]: Jour. Hydrology, v. 2, no. 2, p. 73-91, illus., **1964**. Surface-expression fracture traces reflect underlying fracture concentrations and are useful as a prospecting tool for locating zones of increased weathering, solutioning, and permeability. Demonstrations from wells drilled in Nittany Valley are given.

LEEPER, WAYNE S.

1. Statistical measurements, analysis, and interpretation of primary bedding structures in southeastern Somerset County, Pennsylvania: MS Thesis, Univ. Pittsburgh, **1960**.
2. Interpretation of primary bedding structures in Mississippian and Upper Devonian rocks of southeastern Somerset County, Pennsylvania, in Symposium on Middle and Upper Devonian stratigraphy of Pennsylvania and adjacent states: Pennsylvania Geol. Survey, 4th ser. Bull. G 39, p. 165-181, illus., **1963**. Structures in sandstones in the Devonian Jennings and Catskill Formations and in the Mississippian Pocono Formation were measured. Cross stratification measurement were statistically the most reliable. Only 34° of variation mean were noted between the formations.

LEES, JOHN ALLEN.

1. Stratigraphy of the Lower Ordovician Axemann Limestone in central Pennsylvania: PhD Thesis, Pennsylvania State Univ., **1964**; Pennsylvania Geol. Survey, 4th ser. Bull. G 52, 79 p., illus., **1967**. Two members are recognized in Centre County; the lower one can be further subdivided petrographically. Various types of limestones are present, reflecting different origins, and all are complexly interbedded. Many sections are measured and fossils are listed and illustrated.

LEFELHOCZ, JOHN F.

1. (and Friedel, Robert Augustine, and Kohman, Truman Paul). Mossbauer spectroscopy of iron in coal: Geochim. et Cosmochim. Acta, v. 31, no. 12, p. 2261-2273, illus., **1967**. Anthracite and bituminous coal from Pennsylvania and other coals from elsewhere are used in a study to obtain information about "originally-bound" iron in coal. Some contain iron (II) which is not in marcasite or pyrite.

LEGRAND, HARRY ELWOOD, *see* Meyer, Gerald, 1.

LEIGHTON, MORRIS MORGAN.

1. Arthur Charles Bevan [1888-1968]: State Geologists Jour., v. 20, no. 2, p. 25-26, **1968**.

LENKER, EARLE SCOTT.

1. A trace element study of selected sulfide minerals from eastern United States: PhD Thesis, Cornell Univ., **1961**; [abs.], Dissert. Abs., v. 23, no. 3, p. 994, **1962**; Econ. Geology, v. 57, no. 6, p. 1012, **1962**; Geol. Soc. America Spec. Paper 73, p. 196, **1963**.

LESCINSKY, J. B., *see* Biesecker, J. E., 1.

LESKE, R. H., *see* Biemesderfer, George K., 1.

LEUTZE, WILLARD PARKER.

1. Silurian fish fossils in the Salina Basin: Geol. Soc. America Bull., v. 71, no. 2, p. 215-217, illus., **1960**. A small-scale paleogeographic map of the Salina Basin showing the location of eurypterids and fish includes most of Pennsylvania.

LIDIAK, EDWARD GEORGE, *see* Muehlenbergcr, William Rudolph, 1; Zietz, Isidore, 2.

LIFSCHUTZ, ARTHUR PAUL.

1. Glacial geology of northeastern Tioga County, Pennsylvania: MS Thesis, Pennsylvania State Univ., **1961**.

LINDHOLM, GERALD FRANKLIN, *see* White, Walter Finch, 1.

LINK, HOWARD B., *see* Ash, Simon Harry, 4.

LINN, EARL H.

1. Lower Silurian and Cambro-Ordovician sedimentation of northern Appalachian Basin [abs.]: Am. Assoc. Petroleum Geologists Bull., v. 44, no. 7, p. 1252, **1960**.
2. Success ratios up to 87 percent stir Appalachians [northwestern Pennsylvania]: Oil and Gas Jour., v. 60, no. 10, p. 156-160, illus. incl. port., **1962**. The Silurian Medina Sandstone is an important source of hydrocarbons in the area, and a general summary of its occurrence is given.
3. Fracturing the [Warren County] Glade sand pay boosts Pennsylvania-grade output: Oil and Gas Jour., v. 63, no. 50, p. 144-148, illus., **1965**. Small-scale maps show the structure on top of the Upper Devonian Glade sand and the net thickness of the Glade sand. The average depth is 750 feet.

LIPSCHUTZ, MICHAEL ELAZAR, *see* Jaeger, Ralph Roger, 1; Jain, Anant V., 1.

LJUNGSTEDT, OLOF AXEL, *see* Stose, George Willis, 1.

LOCKWOOD, WILLIAM NOBLE, *see also* Greenman, David Wolcott, 1.

1. (and Meisler, Harold). Illionian outwash in [Bucks County] southeastern Pennsylvania: U. S. Geol. Survey Bull. 1121 B, p. B1-B9, illus., **1960**. Highly weathered sand and gravel in Turkey Hill are described. A ventifact-bearing lag gravel at the top records periglacial conditions. Loess overlies the lag gravel. Wisconsin till overlies the weathered till on the flanks of Turkey Mountain.

LOGAN, JOHN.

1. Oscar Edward Meinzer [1876-1948]— O pai do moderna hidrogeologia: Agua Subterranea, no. 1, p. 15-17, **1965**.

LOHSE, J. M., *see* Ewing, William Maurice, 1, 2.

LONG, LEON EUGENE.

1. (and Kulp, John Laurence, and Eckelmann, Frank Donald). Chronology of major metamorphic events in the southeastern United States: Am. Jour. Sci., v. 257, p. 585-603, illus., **1959**. A general summary of metamorphic events includes a reported K-Ar age of a mica in the Baltimore Gneiss near Radnor, Chester County, of 396 ± 14 my.
2. (and Kulp, John Laurence). Isotopic age study of the metamorphic history of the Manhattan and Reading Prongs: Geol. Soc. America Bull., v. 73, no. 8, p. 969-995, illus., **1962**. Some of the information comes from rocks in southeastern Pennsylvania. K-Ar dates on Wissahickon Schist, from near Neshaminy Falls, Bucks County is 353 ± 14 my old, and Highland Gneiss, from near Wernersville, Berks County, is 821 ± 21 my old. These are parts of 2 of at least 3 metamorphic events which have been reeognized in the region.

LONGWILL, STANLEY MILLER, *see also* Meisler, Harold, 1; Rima, Donald Robert, 2.

1. Pennsylvania, *in* Ground-water levels in the United States 1956-1957, northeastern states: U. S. Geol. Survey Water-Supply Paper 1537, p. 119-139, illus., **1960**. Levels of the ground-water table below the surface are recorded throughout the two years from observation wells throughout Pennsylvania. Discussions of the water-bearing formations are included.
2. (and Wood, Charles R.). Ground-water resources of the Brunswick Formation in Montgomery and Berks Counties, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull W 22, 59 p., illus. incl. geol. map, **1965**. Various lithologic units within the formation are described, and their water-bearing properties discussed. Some attention is paid also to the Lockatong Formation. Analyses are included.

LOUGHRY, F. GLADE.

1. The soil facts for Montgomery County planning, *in* Soils and land-use planning: Chicago, Ill., Am. Soc. Planing Officials, p. 39-44, illus., **1966**. A description of the soils of the county, the means by which they were studied, and some of the potential uses of the results are described. The influence of topography on the soil is described also.

2. The soil factor in sanitary landfill: *Pennsylvania Acad. Sci. Proc.*, v. 41, p. 156-160, illus., **1967**. Detailed soil survey data for over 7 million acres of Pennsylvania are interpreted for sanitary landfill suitability. Factors include soil depth, drainage or depth to water table, texture, stoniness, kind of substream, slope, texture, and flooding hazards. Only nine percent of the area studied would be considered suitable.

LOUNSBURY, RICHARD WILLIAM.

1. (and Melhorn, Wilton Newton). Clay mineralogy of Paleozoic K-bentonites of the eastern United States (Part 1) *in* *Clays and clay minerals—Proceedings of the 12th National conference on clays and clay minerals*: New York, MacMillan Co. (Mon. 19, Earth Sci. Ser.), p. 557-565, illus., **1964**. Devonian and Ordovician bentonite from central Pennsylvania are included. Mixed layer illite-montmorillonite are common to most. Illite is present in all, and chlorite and kaolinite are present in a few.

LOVE, G. E. W.

1. Structural interpretation of the geology near Morgantown, [Berks County] southeastern Pennsylvania: *Pennsylvania Acad. Sci. Proc.*, v. 45, p. 177-179, illus., **1969**. Axial plane cleavage and overturned sections in a rock of uncertain age, but probably Cambrian or Ordovician, reveals possible recumbency in the area previously mapped as structurally very simple.

LOVELL, HAROLD LEMUEL, *see* Dutcher, Russell Richardson, 1, 2.

LUDLUM, JOHN CHARLES.

1. Structural transitions revealed by exploration for natural gas in West Virginia and northward [abs.]: *Geol. Soc. America Spec. Paper* 68, p. 75-76, **1962**.

LUFT, STANLEY JEREMIE, *see* Colton, George Willis, 4.

LUTTRELL, ERIC MARTIN.

1. An analysis of the Silurian Keefer Sandstone of [central] Pennsylvania: PhD Thesis, Princeton Univ., **1968**; [abs.], *Dissert. Abs. Internatl. B*, v. 30, no. 1, p. 258B-259B, **1969**.

LYELL, CHARLES, 1797-1875.

1. A second visit to the United States of North America, v. 2: New York, Harper and Bros., 287 p., illus., **1849**. A narrative account of the geomorphology and geology of Pennsylvania from Pittsburgh to Philadelphia is included in a narrative of his travels in the United States in 1845. Accounts of finding vertebrate fossils in the [Pennsylvania] rocks of western Pennsylvanian are included.

LYFORD, WALTER HENRY, *see* Denny, Charles Storrow, 1, 2.

LYNCH, J. H., JR., *see* Birge, George W., 2.

LYNCH, JOHN D.

1. Additional treefrogs (Hylidae) from the North American Pleistocene [Bedford County]: Carnegie Mus. Annals, v. 38, p. 265-271, illus., 1966. Fragments of *Hyla crucifer* from Pleistocene cave-filling deposits at the New Paris sinkhole no. 4 are discussed. They are larger than those from living frogs, and this is the first record of this species as a fossil.

LYONS, PAUL LIGHTNER.

1. Trenton extent in the United States—A regional study: Tulsa Geol. Soc. Digest, v. 34, p. 99-109, illus., 1966. A general survey of the origin and distribution of rocks of this stage includes those in Pennsylvania. Small-scale isopach and lithofacies maps are included. No new data from Pennsylvania are given.

LYTLE, WILLIAM STUCKLEY, *see also* Fettke, Charles Reinhard, 16, 19; Kelley, Dana Robineau, 5; Seifert Wilbur H., 1; Wagner, Walter Richard, 8.

1. Oil and gas developments in Pennsylvania in 1956: Natl. Oil Scouts and Landsmen's Assoc. Yearbook 1957, v. 27, p. 730-735, illus., 1957.
2. Pennsylvania [oil and gas production for 1956]: Am. Inst. Mining, Metallurgical and Petroleum Engineers, Statistics of Oil and Gas Development and Production, v. 11, covering 1956, p. 134-144, illus., 1957; [. . . for 1957]: . . . v. 12, covering 1957, p. 98-104, illus., 1959; [. . . for 1958]: . . . v. 13, covering 1958, p. 100-106, illus., 1959.
3. (and others). [Oil and gas] Developments in Pennsylvania in 1959: Am. Assoc. Petroleum Geologists Bull., v. 44, no. 6, p. 688-703, illus., 1960; Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 157, 54 p., illus., 1960.
4. Pennsylvania oil and gas developments 1959: Internatl. Oil Scouts and Landsmen's Assoc. Yearbook 1960, v. 30, pt. 1, p. 409-417, illus., 1960; . . . 1960: . . . Yearbook 1961, v. 31, pt. 1, p. 257-264, illus., 1961; . . . 1961: . . . Yearbook 1962, v. 32, pt. 1, p. 264-271, illus., 1962; . . . 1962: . . . Yearbook 1963, v. 33, pt. 1, p. 271-280, illus., 1963.
5. [Oil and gas] Developments in Pennsylvania in 1960: Am. Assoc. Petroleum Geologists Bull., v. 45, no. 6, p. 734-748, illus., 1961; (and others). Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 158, 50 p., illus., 1961.
6. (and others). A summary of oil and gas developments in Pennsylvania, 1955 to 1959: Pennsylvania Geol. Survey, 4th ser. Bull. M 45, 133 p., illus., 1961. This bulletin supplements M 31 and M 39 which give well records. Records for 680 wells below the Devonian Tully Formation are given. Correlations are suggested and the stratigraphy is evaluated. Many specific oil and gas fields are described.
7. [Oil and gas] Developments in Pennsylvania in 1961: Am. Assoc. Petroleum Geologists Bull., v. 46, no. 6, p. 778-795, illus., 1962; (and others). Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 160, 55 p., illus., 1962.
8. [Oil and gas] Developments in Pennsylvania in 1962: Am. Assoc. Petroleum Geologists Bull., v. 47, no. 6, p. 940-955, illus., 1963; Internatl. Oil Scouts and Landsmen's Assoc. Yearbook 1963, v. 33, pt. 1, p. 271-280, illus., 1963; (and others). Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 165, 44 p., illus., 1963.
9. (and Heeren, Lillian A.). Preliminary report of the oil and gas resources of the Warren 7½" quadrangle, [Warren County] Pennsylvania: Penn-

- sylvania Geol. Survey, 4th ser. Prog. Rept. 163, 1 sheet, text, **1963**. A cursory summary of the Devonian-Pennsylvanian rocks is given along with a discussion of the occurrence of oil and gas which is in the Glade Sand in the Upper Devonian.
10. Underground gas storage in Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Mineral Resource Rept. M 46 [Bull. M 46], 31 p., illus., **1963**. Gas is stored in 61 depleted gas pools in rocks from Silurian to Pennsylvanian age in depth from 1,000 to 6,000 feet. All are in stratigraphic-type traps except those in the Oriskany which are in structural traps. Various pools are described.
 11. [Oil and gas] Developments in Pennsylvania, 1963: Am. Assoc. Petroleum Geologists Bull., v. 48, no. 6, p. 784-800, illus., **1964**; (and others). Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 166, 47 p., illus., **1964**.
 12. (and Fairall, Virginia). [Map of] Oil and gas fields of Pennsylvania—data complete to 1963: Pennsylvania Geol. Survey, 4th ser. Map 3, scale, 1 in. to 5 miles, **1964**.
 13. Pennsylvania, oil and gas development in 1963: Internatl. Oil and Gas Development Yearbook 1964, v. 34, pt. 1, p. 270-276, illus., **1964**; . . . in 1964: . . . Yearbook 1965, v. 35, pt. 1, p. 280-283, illus., **1965**; . . . in 1965: . . . Yearbook 1966, v. 36, pt. 1, p. 269-273, illus., **1966**; . . . in 1966: . . . Yearbook 1967, v. 37, pt. 1, p. 298-304, illus., **1967**; . . . in 1967: . . . Yearbook 1968, v. 38, pt. 1, p. 261-266, illus., **1968**.
 14. [Oil and gas] Developments in Pennsylvania, 1964: Am. Assoc. Petroleum Geologists Bull., v. 49, no. 6, p. 666-672, illus., **1965**; (and others). Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 168, 55 p., illus., **1965**.
 15. Guidebook—Field trip through Pennsylvania's historical oil fields, 1965—Interstate Oil Compact Commission [Meeting in Pittsburgh, 1965]: [Harrisburg], Pennsylvania Geological Survey, 65 p., illus., **1965**. An historical summary of the history of the oil-field development in Venango County and vicinity, including that of Edwin Drake and the town of Pithole, is followed by an itinerary for a field trip from Pittsburgh to Titusville and to Pithole. The trip is 124 miles long and makes 2 formal stops at geologically interesting places. Much information, geological and historical, is included *en route*, however.
 16. Oil and gas geology of the Warren Quadrangle, [Warren County] Pennsylvania Geol. Survey, 4th ser. Bull. M 52, 84 p., illus., **1965**. Pennsylvanian-Devonian rocks are discussed, and hundreds of well records were used to determine the subsurface structure and stratigraphy. Oil and gas come from Upper Devonian rocks in stratigraphic traps. A few deep tests down into the Cambrian rocks are recorded.
 17. (and McGlade, William George, and Wagner, Walter Richard). Pennsylvania, in Oil and gas developments in northeastern states in 1965: Am. Assoc. Petroleum Geologists Bull., v. 50, no. 6, p. 1145-1151, illus., **1966**; (and others). Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 172, 66 p., illus., **1966**.
 18. Pennsylvania, in Oil and gas developments in northeastern states in 1966: Am. Assoc. Petroleum Geologist Bull., v. 51, no. 6, p. 1011-1017, illus., **1967**; (and Heyman, Louis, and Wagner, Walter Richard). Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 173, 51 p., illus., **1967**.

19. (and Heyman, Louis, and Wagner, Walter Richard). Elk Run field, Jefferson County, Pennsylvania, *in* Oil and gas developments in Pennsylvania in 1967: Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 175, p. 15, 20, illus., **1968**. The Elk Run field is a stratigraphic trap typical of the northeast-southwest trending series of "Oriskany" gas fields on the east limb of the Sabinsville antiline. Closure is due to updip porosity loss. A small-scale net pay map is included.
20. Pennsylvania, *in* Oil and gas developments in North Carolina, Maryland, Virginia, Pennsylvania, West Virginia, and Ohio [in 1967]: Am. Assoc. Petroleum Geologists Bull., v. 52, no. 6, p. 948-951, illus., **1968**; (and Heyman, Louis, and Wagner, Walter Richard). Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 175, 38 p., illus., **1968**.
21. Pennsylvania, *in* Oil and gas developments in Maryland, Ohio, Pennsylvania, Virginia, and West Virginia [in 1968]: Am. Assoc. Petroleum Geologists Bull., v. 53, no. 6, p. 1199-1203, illus., **1969**.

MacDONALD, ROBERT B.

1. A petrological study of the recent sands of the Delaware River [eastern Pennsylvania]: MS Thesis, Rutgers Univ., **1961**.

MacFALL, RUSSELL P.

1. Gem hunter's guide . . . : New York, Thomas Crowell, 278 p., illus., revised **1969**. A general, popular account of the nature and occurrence of gems includes collecting locations in many places, including southeastern Pennsylvania.

MacGREGOR, ARCHIBALD GORDON.

1. Memorial to Sir Edward B[attersby] Bailey, Kt, M.C., F.R.S. (1881-1965): Geol. Soc. America Bull., v. 77, no. 3, p. P31-P39, port., **1966**.

MacKENZIE, FREDERICK THEODORE.

1. Stratigraphy, *in* Structure and stratigraphy of the Reading Hills and Lehigh Valley in Northampton and Lehigh Counties, Pennsylvania—Field Conf. Pennsylvania Geologists, 26th: Bethlehem, Pennsylvania, Lehigh Univ., p. 14-24, illus., **1961**. Precambrian to Silurian and Triassic rocks are very cursorily discussed as part of the preparation for a field trip. The relationship of the lower Paleozoic rocks to positions in the tectonic cycle of geoclines is also discussed. The Cambrian and Ordovician carbonates are considered pre-orogenic, the Martinsburg is considered flysch, and the Silurian clastic formations are thought of as molasse.

MacLACHLAN, DAVID B.

1. Major nappe in the Susquehanna River [Dauphin County] (Pennsylvania) region of the Great Valley [abs.]: Geol. Soc. America Spec. Paper 82, p. 126-127, **1965**.
2. (and Root, Samuel I.). Comparative tectonics and stratigraphy of the Cumberland and Lebanon Valleys—Field Conf., Pennsylvania Geologists, 31st: Harrisburg, Pennsylvania Topog. and Geol. Survey, 90 p., illus.

incl. geol. maps, **1966**. Considerable discussion of the comparable stratigraphy, tectonics, and geomorphology of the two areas is followed by a road log and guide for a field trip of two days. The first five stops on the first day are in southern Franklin County, and the seven stops on the second day are in Dauphin and Lebanon Counties. Each of the stops is discussed in great detail and geological observations along the way are recorded.

3. Structure and stratigraphy of the limestones and dolomites of Dauphin County, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. G 44, 168 p., illus. incl. geol. map, **1967**. Cambrian and Ordovician rocks, largely carbonates, are described petrographically and stratigraphically. Numerous analyses are included. Detailed measured sections and economic potentials are also given.

MacLEAN, WILLIAM FINLEY.

1. Postglacial uplift in the Great Lakes region: PhD Thesis, Univ. Michigan, **1962**; [abs.], Dissert. Abs., v. 23, no. 2, p. 601-602, **1962**.

MACFARLANE, ROBERT M.

1. (and Piper, Duane J.). Quantitative log analysis for various Devonian sandstones in northwestern Pennsylvania: Producers Monthly, v. 30, no. 10, p. 2-6, illus., **1966**. Examples from several sandstones in northwestern Pennsylvania are used to show the influence of various geological properties upon various types of quantitative log analyses, e.g., from spontaneous potential, gamma-neutron, density, and caliper logs. Combinations of logging techniques can be used to determine certain specific rock properties.

MACKIN, JOSEPH HOOVER, 1905-1969.

1. Structure of the Glenarm Series in Chester County, Pennsylvania: Geol. Soc. America Bull., v. 73, no. 3, p. 403-409, illus., **1962**. The orientation of lineation in the Glenarm Series and in the rocks of the Woodville structure suggest that the structure is part of the inverted limb of a recumbent fold, a nappe, rather than an upwarp involving two gneiss-cored anticlines.

MALDE, HAROLD EDWIN.

1. The ecologic significance of some unfamiliar geologic processes, *in* The reconstructions of past environments: Santa Fe, New Mexico, Fort Burgwin Research Center, p. 7-13, illus., **1964**; discussions, p. 13-15. Examples of tree fall as a geomorphologic agent are described from Potter County. Tree fall opens soils to erosion and fallen trees act as dams to slope wash.

MAMAY, SERGIUS HARRY, *see* Read, Charles Brian, 1, 2.

MANSFIELD, SILAS PECK.

1. (and Spackman, William, and Dutcher, Russell Richardson). Sulfur studies of selected bituminous coal seams in [western] Pennsylvania [abs.]: Geol. Soc. America Bull., v. 71, no. 12, pt. 2, p. 1922, **1960**.

2. Petrographic composition and sulfur content of selected [western] Pennsylvania bituminous coal seams: MS Thesis, Pennsylvania State Univ., **1965**.

MANSPEIZER, WARREN.

1. Longitudinal transport of Upper Devonian sediments in the Appalachian Geosyncline, western New York and Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 115, p. 276, **1968**.
2. The Catskill Delta complex—distributaries in the Bradford subdelta [northwestern Pennsylvania] [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 1, p. 39, **1969**.

MANTEN, A. A..

1. (and DeMunter-Thompson, D. V.). Grove Karl Gilbert (1843-1918): Earth-Sci. Rev., v. 4, no. 4, p. A260-A262, **1968**.

MARANO, DAVID, *see* Wilson, Stanley D., 1.

MARK, HELEN R.

1. High-alumina kaolinitic clay in the United States, exclusive of Alaska and Hawaii: U. S. Geol. Survey Mineral Invs. Resource Map MR 37, scale, 1:3,168,000, separate text, **1963**. Such clays occur in weathered dikes in Chester County and throughout western Pennsylvania, associated with the coal deposits.

MARPLE, MILDRED FISHER, *see* Hyde, Jesse Earl, 1.

MARSTERS, BEVERLY A.

1. Some unusual forms of pyrite from French Creek [Chester County] Pennsylvania: MA Thesis, Bryn Mawr College, **1963**.

MARTENS, JAMES HART CURRY.

1. Memorial to Albert Samuel Wilkerson (1897-1963): Geol. Soc. America Bull., v. 75, no. 4, p. P67-P69, port., **1964**.

MARTIN, PAUL SCHULTZ, *see* Guilday, John E., 10.

MARTIN, ROBERT A.

1. Late Pleistocene distribution of *Microtus pennsylvanicus*: Jour. Mammalogy, v. 49, no. 2, p. 265-271, illus., **1968**. The vole is found throughout almost all of the United States and Canada, including some from Pennsylvania. It ranged southward during the glaciation as it currently is confined to northern Canada.

MARTIN, WAYNE DUDLEY.

1. (and Henniger, Bernard Robert). The Hockingport and Waynesburg Sandstones (Pennsylvanian and Permian) of the Dunkard Group [southwestern Pennsylvania] [abs.]: Am. Assoc. Petroleum Geologists Bull., v. 49, no. 3, p. 348-349, **1965**.
2. (and Henniger, Bernard Robert). Mather and Hockingport Sandstone Lentils (Pennsylvanian and Permian) of Dunkard Basin, [southwestern

Pennsylvania], West Virginia and Ohio: Am. Assoc. Petroleum Geologists Bull., v. 53, no. 2, p. 279-298, illus., **1969**. The Mather Sandstone Lentil is identified from what was formerly considered the Waynesburg Sandstone; it is a subgraywacke and is a belt-type deposit of fluvial origin. It is up to 75 feet thick and about 42 miles of length have been preserved. The preserved width ranges from 11 to 20 miles.

MARTINSSON, ANDERS.

1. An Appalachian species of the Silurian ostracode genus *Craspedobolbina* [Blair County]: Geol. Foeren. Stockholm Forh., v. 90, no. 2, p. 302-308, illus., **1968**. *Craspedobolbina kirki*, from the Rose Hill Formation in Blair County, is described and illustrated. This is the first of this genus recognized in America.

MASON, BRIAN.

1. The irons, Chapter 9 in *Meteorites*: New York, John Wiley and Sons, p. 130-147, illus., **1962**. The Mount Joy [Adams County] hexahedrite is discussed as an example of a special group of meteorites.
2. Olivine composition in chondrites: *Geochim. et Cosmochim. Acta*, v. 27, no. 10, p. 1011-1023, illus., **1963**. The Black Moshannon Park (Centre County) meteorite has an olivine composition in mole percent of Fe_2SiO_4 (Fa) of 24.
3. The meteorite and tektite collection of the American Museum of Natural History: Am. Mus. Novitates, no. 2190, 40 p., illus., **1964**. Fragments of the Mount Joy (Adams County), New Baltimore (Somerset County), Pittsburgh (Allegheny County), and Shrewsbury (York County), are present.

MATELSKI, ROY P., *see* Johnson, Leon Joseph, 1; Peterson, Gary Walter, 1, 2.

MATZKE, RICHARD H., *see also* Lattman, Laurence Harold, 3.

1. Fracture trace and joint patterns in western Centre County, Pennsylvania: MS Thesis, Pennsylvania State Univ., **1961**.

MAXWELL, JOHN CRAWFORD.

1. Origin of slaty and fracture cleavage [Northampton County] [abs.]: Geol. Soc. America Bull., v. 71, no. 12, pt. 2, p. 1923-1924, **1960**.
2. Origin of slaty and fracture cleavage in the Delaware Water Gap area, New Jersey and [eastern] Pennsylvania, in *Petrologic studies—A volume in honor of A. F. Buddington*: New York, Geol. Soc. America, p. 281-311, illus., **1962**. Slaty cleavage is in Ordovician Martinsburg Formation only, whereas fracture cleavage is impressed upon all the rocks of the region. The slaty cleavage only is a result of metamorphism of Ordovician-aged folding.

MAXWELL, NORMAN E.

1. Producing formations and production practice in the Titusville-Oil City district [Venango County], in *Proceedings of the third Pennsylvania mineral industries conference . . .*: Pennsylvania State Coll. Mineral Industries Exper. Sta. Bull. 12, p. 17-24, illus., **1933**; discussions, p. 24-28.

The type and distribution of the oil-producing sands from the Devonian rocks are discussed. The relations between the sand and enclosing shales are especially significant.

MAYERS, DONALD E.

1. (and Reiche, Jay R., Jr.). Red Hill Cave, Lancaster County, Pennsylvania: York Grotto Newsletter, v. 2, no. 10, p. 148-149, illus., 1961.

MAYNE, RICHARD D., *see* Fettke, Charles Reinhard, 6.

MAYR, U.

1. Subdivisions and correlation of the Tully Formation (Upper Devonian) in New York State and Pennsylvania on the basis of a statistical and stratigraphical analysis of selected conodonts: PhD Thesis, Univ. Ottawa, 1966; [abs.], Bull. Canadian Petroleum Geology, v. 16, no. 3, p. 421, 1968.

MAZOR, EMANUEL, *see* Wasserburg, Gerald Joseph, 1.

McALESTER, ARCIE LEE.

1. Upper Devonian pelecypods of the New York Chemung stage: PhD Thesis, Yale Univ., 1960; Yale Univ. Peabody Mus. Nat. Hist. Bull. 16, 88 p., illus. incl. geol. map, 1962. Numerous genera and species are described and illustrated. Some are from locations in Tioga and Bradford counties.
2. Pelecypods as stratigraphic guides in the Appalachian Upper Devonian: Geol. Soc. America Bull., v. 74, no. 10, p. 1209-1223, illus., 1963. Pelecypods in the Chemung Stage are dominant, diverse, widely dispersed, and very useful in evaluating the stratigraphy. Seventy percent of the complexity has been reduced by a taxonomic revision. No significant evolutionary changes are detected; almost all differences are environmental.

McBRIDE, EARLE FRANCIS.

1. Martinsburg [Ordovician] flysch of the central Appalachians: PhD Thesis, Johns Hopkins Univ., 1960.
2. Flysch and associated beds of the Martinsburg Formation (Ordovician), central Appalachians: Jour. Sed. Petrology, v. 32, no. 1, p. 39-91, illus., 1962. Graded bedding, sole marks, intraformational shale fragments, convolute and small-scale cross-lamination suggest a turbidity current origin. A low grade metamorphic provenance is suggested; acid plutonic rocks are a secondary source. Much information comes from southeastern Pennsylvania.

McCALL, RONALD M., *see* Shirk, William R., 1.

McCARL, HENRY NEWTON.

1. A study of the [Pennsylvanian] Lower Kittanning underclay near Curwensville [Clearfield County] Pennsylvania: MS Thesis, Pennsylvania State Univ., 1965.

McCAREN, EDWARD F.

1. (and Wark, John William, and George, John R.). Hydrologic processes diluting and neutralizing acid streams of the Swatara Creek Basin, Pennsylvania, in Geological Survey research 1961: U. S. Geol. Survey Prof. Paper 424 D, p. D64-D67, illus., **1961**. Acid mine water is neutralized by Swatara Creek because of the dilution by neutral water coming from tributaries draining sandstone terrain, and which then is neutralized by bicarbonate-bearing water coming from tributaries draining limestone terrain.
2. Chemical quality of the surface water in the Allegheny River Basin, [northwestern] Pennsylvania and New York: U. S. Geol. Survey Ground-Water Paper 1835, 74 p., illus., **1967**. The influence of the geology of the region upon the chemistry of the surface water is included. Devonian-Pennsylvanian rocks are discussed, with emphasis upon the geohydrology thereof.
3. (and Keighton, Walter Barker, Jr.). Water quality and discharge of streams in the Lehigh River Basin [eastern] Pennsylvania: U. S. Geol. Survey Water-Supply Paper 1879 H, p. H1-H48, illus., **1969**. The influence of the geology of the various drainage basins upon the chemistry of the surface water is stressed.

McCARTNEY, JAMES THOMAS, *see also* Ergun, Sabri, 2.

1. (and Ergun, Sabri). Optical properties of coals and graphite: U. S. Bur. Mines Bull. 641, 49 p., illus., **1967**. Coals from various places in Pennsylvania and from elsewhere are used to demonstrate various optical properties in various regions of the electromagnetic spectrum. Reflectance is most important.

McCASLIN, JOHN CALVIN.

1. Deeper drilling may tap new eastern reserves: Oil and Gas Jour., v. 58, no. 3, p. 131, illus., **1960**. This is a general exhortation for the lower Paleozoic rocks in northwestern Pennsylvania to be included as potential producing rocks.
2. Pennsylvania drillers show new interest in oildom's old lady [McKean County]: Oil and Gas Jour., v. 64, no. 34, p. 149, illus., **1966**. Various bits of geological information are included in an otherwise review of current drilling activity in the county in and around the Bradford oil field.

McCAULEY, JOHN FRANCIS.

1. Uranium in Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. M 43, 71 p., illus., **1961**. Forty-three uranium occurrences throughout the state are summarized. Examples are cited by geologic age, but none of the deposits are of economic value. Most are of the "sandstone type" and are in Devonian rocks.

McCRADY, ALLEN D., *see also* Guilday, John E., 7, 10, 12.

1. Prospecting limestone areas for Pleistocene vertebrate fossils: Nittany Grotto News, v. 7, no. 8, p. 154-161, illus., **1959**; Speleo Digest 1959, p. II121-II129, illus., **1961**. A semi-popular account of the origin and importance of bone-bearing caves includes numerous examples from Pennsylvania.

2. (and Guilday, John E.). Final report—Late Pleistocene fauna of New Paris no. 4 (Lloyds Rock Hole) Cave [Bedford County]: *Netherworld News*, v. 11, no. 8, p. 153-162, illus., **1963**; *Speleo Digest* 1963, p. II89-II98, illus., **1965**. Pollen, charcoal and over 3,000 individual animals are investigated to reconstruct the climate of the time.
3. The last time I saw New Paris [sinkhole cave, Bedford County]: *Netherworld News*, v. 17, no. 3, p. 92-101, illus., **1969**. This is a popular account of the excavation of bone-bearing debris-filled solution pits in Bedford County. A new pit, Bear Sink, is excavated. A map is included.

McDOWELL, FRED WALLACE, *see* Beerbower, James Richard, 1.

McGARR, ARTHUR.

1. (and Vorhis, Robert Carson). Seismic seiches from the March 1964 Alaska earthquake, *in* The Alaska earthquake . . . Effects on hydrologic regimen: U. S. Geol. Survey Prof. Paper 544E, p. E1-E43, illus., **1968**; revised and reprinted *in* The great Alaska earthquake, p. 196-236, illus., Washington, D. C., Natl. Acad. Sci., **1968**. Two streams in the Commonwealth responded to the earthquake by seiching, the maximum amplitude being 0.5 feet. Also, 1.8% of the water gages recorded the quake.

McGILL, DENNIS.

1. Composition of sand from sand bank room, Cleversburg Sink [Cave, Cumberland County]: *York Grotto, Newsletter*, v. 1, no. 5, p. 30, **1958**; *Speleo Digest* 1959, p. II100, **1961**. The sand is coarse, composed largely of quartz grains and has a small amount of clay present. The brownish color is from limonite.
2. [Map of] Mount Joy Cave no. 1, Lancaster County, Pa.: *York Grotto Newsletter*, v. 2, no. 9, p. 135, **1961**.

McGLADE, WILLIAM GEORGE, *see also* Kelley, Dana Robineau, 4; Lytle, William Stuckley, 7, 8, 11, 14, 17.

1. Oil and gas geology of the Youngsville Quadrangle [Warren County] Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. M 53, 56 p., illus., **1964**. Rocks of Pennsylvanian to Devonian age are discussed, but the oil and gas comes only from sandstones in the Devonian, and mostly from the Glade Sandstone. The production is largely from stratigraphic traps, and many maps and cross sections show its distribution.
2. Current activities in the Pennsylvania oil and gas fields: *Interstate Oil Compact Commission Bull.*, v. 7, no. 1, p. 37-44, illus., **1965**.
3. Oil and gas geology of the Amity and Claysville Quadrangles, [Washington County] Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. M 54, 131 p., illus., **1967**. Drillers logs and geological observations are utilized to evaluate the oil and gas occurrences. There are 22 productive or potentially productive oil and/or gas fields. Pennsylvanian-Devonian rocks are present, and most of the oil and gas comes from Devonian and Mississippian rocks. Gentle folds are present.
4. Archbald State Park—Archbald Pothole [Lackawanna County] Pennsylvania Geol. Survey, 4th ser. State Park Guide 3, 1 sheet, text, [**1969**].

This is a popular account of the origin of the largest known pothole in the world. It is formed in the bed of the small creek by glacial meltwater having fallen through a crevasse at the time the area was covered with glacial ice.

McGUINNESS, CHARLES LEE.

1. Pennsylvania, *in* The role of ground water in the national water situation: U. S. Geol. Survey Water-Supply Paper 1800, p. 715-729, **1963**. A very general summary of the ground water occurrences, reserves, and potential is given. There are large resources.
2. Generalized map showing annual runoff and productive aquifers in the conterminous United States: U. S. Geol. Survey Hydrol. Invs. Atlas HA 194, scale, 1:5,000,000, **1964**. Several different types of aquifers occur in Pennsylvania, principally alluvium in river channels and in some sandstones.

McIVER, NORMAN LEWIS.

1. Upper Devonian paleocurrents in the central Appalachian Mountains [abs.]: Geol. Soc. America Bull., v. 71, no. 12, pt. 2, p. 1926, **1960**.
2. Upper Devonian marine sedimentation in the central Appalachians: PhD Thesis, Johns Hopkins Univ., **1961**.

McKAGUE, HERBERT LAWRENCE, *see also* Lapham, Davis Mortimer, 8, 11.

1. The geology, mineralogy, petrology, and geochemistry of the State Line Serpentinite and associated chromite deposits [Lancaster and Chester Counties]: PhD Thesis, Pennsylvania State Univ., **1964**: [abs.], Dissert. Abs., v. 25, no. 11, p. 6671, **1965**.
2. Petrology of the State Line Serpentinite [Lancaster County] Pennsylvania-Maryland [abs.]: Geol. Soc. America Spec. Paper 115, p. 279, **1968**.
3. The effects of serpentization upon the trace element distribution in the State Line Serpentinite [Lancaster County] [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 1, p. 39-40, **1969**.

McKINSTRY, HUGH EXTON, 1896-1961.

1. Structure of the Glenarm Series in Chester County, Pennsylvania: Geol. Soc. America Bull., v. 72, no. 4, p. 557-578, illus., **1961**. The rocks are probably Paleozoic in age, and show strongly overturned and locally recumbent folds. Bedding and cleavage have undergone deformation, increasing in intensity toward the southeast. The late-stage deformation is related mechanically to the change in strike of the Appalachian belt: the proposed Martic Thrust need not be.

McKNIGHT, EDWIN THOR.

1. (and Newman, William Louis, and Heyl, Allen Van, Jr.). Lead in the United States exclusive of Alaska and Hawaii: U. S. Geol. Survey Mineral Invs. Resource Map MR 15, scale, 1:3,168,000, separate text, **1962**. Lead is known only from veins in joints in Triassic rocks near Phoenixville, Chester County and in Precambrian gneiss and granodiorites.
2. (and Newman, William Louis, and Klemic, Harry, and Heyl, Allen Van, Jr.). Silver in the United States, exclusive of Alaska and Hawaii: U. S. Geol. Survey Mineral Invs. Resource Map MR 34, scale, 1:3,168,000,

separate text, **1962**. Silver occurs in the pyrite associated with the Cornwall magnetite deposit in Lebanon County.

3. (and Newman, William Louis, and Heyl, Allen Van, Jr.). Zinc in the United States, exclusive of Alaska and Hawaii: U. S. Geol. Survey Mineral Invs. Resource Map MR 19, scale, 1:3,168,000, separate text, **1962**. Zinc-bearing minerals are known from numerous places throughout the state, but the principal deposit is at Friedensville in Lehigh County.

McLAUGHLIN, DEAN BENJAMIN, 1901-1965, *see also* Drake, Avery Ala, Jr., 2, 6; Geyer, Alan Raymond, 1.

1. Notes on the New Oxford Formation and the limestone conglomerate at Conoy Creek [Lancaster County], in Some tectonic and structural problems of the Appalachian Piedmont along the Susquehanna River—Field Conf. Pennsylvania Geologists, 25th: Lancaster, Franklin and Marshall College, p. 84-88, illus., **1960**. Detailed stratigraphic, structural, and sedimentologic features of the formation are given. A basal limestone-pebble conglomerate is especially well-developed and is overlain by arkose, quartz conglomerate, and shale.
2. Some features of the Triassic north border in [southeastern] Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 35, p. 124-128, **1961**. Unfaulted, unconformable contacts between Triassic and Paleozoic rocks are described, though minor faulting is present locally. Areas of limestone conglomerate are briefly described also.
3. Newly recognized folding in the Triassic of Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 37, p. 156-159, illus., **1963**. Three conglomerate members and interbedded sandstones of the Gettysburg Formation, aggregating 1,200 feet in thickness, are exposed in an eastward-plunging syncline and a complimentary northeastward-plunging antiform near Fritztown, Berks County.

McQUILLIN, THOMAS ALAN.

1. The areal extent and correlation of the [Pennsylvanian] Deer Valley Limestone of Somerset County, Pennsylvania: MS Thesis, Univ. Pittsburgh, **1960**.

MECKEL, LAWRENCE DANIEL, JR.

1. Pottsville conglomerates in Pennsylvania—paleocurrents and origin [abs.]: Am. Assoc. Petroleum Geologists Bull., v. 48, no. 4, p. 538, **1964**.
2. Pottsville sedimentology, central Appalachians: PhD Thesis, Johns Hopkins Univ., **1966**.
3. Origin of Pottsville conglomerates (Pennsylvanian) in the central Appalachians: Geol. Soc. America Bull., v. 78, no. 2, p. 223-257, illus., **1967**. The Olean Conglomerate in the northwestern part of Pennsylvania is equivalent to a part of the much thicker Pottsville. The former was deposited in a trough, the detritus having come from the southeast, and the latter was deposited on a platform adjacent and to the northwest of the trough, by two stream systems. Some of the material filled the trough and spread northwestward.

MEDVILLE, DOUGLAS, *see* Forney, Gerald Glenn, 1.

MEISLER, HAROLD, *see also* Greenman, David Wolcott, 1; Lockwood, William Noble, 1; Rima, Donald Robert, 2.

1. (and Longwill, Stanley Miller). Ground-water resources of Olmsted Air Force Base, Middletown, [Dauphin County] Pennsylvania: U. S. Geol. Survey Water-Supply Paper 1539 H, p. H1-H34, illus., **1961**. Ground-water comes from the underlying Gettysburg Shale of Triassic age. Some portions contain good aquifers whereas other portions have poor aquifers. The Susquehanna River serves as the recharge area.
2. Geology and hydrology of the carbonate rocks of the Lebanon Valley Pennsylvania: U. S. Geol. Survey Repts. Open File, 122 p., illus., **1962**. [not seen].
3. Origin of erosional surfaces in the Lebanon Valley, [Dauphin, Lebanon, and Berks Counties] Pennsylvania: Geol. Soc. America Bull., v. 73, no. 9, p. 1071-1082, illus., **1962**. The peneplain concept does not adequately account for the landforms of the Lebanon Valley which are the result of the erosion of two stream systems. Accordance of summits is the result of uniform lowering of rocks of uniform character and structure.
4. Hydrogeology of the carbonate rocks of the Lebanon Valley, [Lebanon and Berks Counties] Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. W 18, 81 p., illus. incl. geol. map, **1963**. Cambrian and Ordovician carbonate rocks are described and their water-bearing properties discussed. The influences of structure upon the water-yielding capacity is discussed. Analyses are included.
5. (and Becher, Albert E.). Hydrology of the carbonate rocks of the Lancaster 15-minute quadrangle [Lancaster and Lebanon Counties] Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 171, 36 p., illus., **1966**. Cambrian and Ordovician limestone and dolomite are present and are severely folded and faulted. The water-bearing properties of each of the units is discussed as is the general occurrence of ground-water in them. Analyses are included.
6. (and Becher, Albert E.). Hydrologic significance of calcium-magnesium ratios in ground water from carbonate rocks in the Lancaster Quadrangle [Lancaster-Lebanon Counties] Pennsylvania, *in* Geological Survey research 1967: U. S. Geol. Survey Prof. Paper 575 C, p. C232-C235, illus., **1967**. The ratios in equivalents of Ca to Mg in groundwater from limestones and dolomites correlate well with the composition of the carbonate source rock. When applied with caution, Ca-Mg ratios in ground water can be an aid to geologic mapping of a limestone and dolomite terrain.
7. (and Becher, Albert E.). Carbonate rocks of Cambrian and Ordovician age in the Lancaster Quadrangle [Lancaster and Lebanon Counties] Pennsylvania: U. S. Geol. Survey Bull. 1254 G, p. G1-G14, illus., **1968**. A detailed description of the stratigraphic position results in the recognition of 14 distinct units, some of which are new. The Conococheague and Beekmantown units are elevated to group level and correlations are made with other units elsewhere in the state.

MEISS, DONALD P.

1. Paleozoic rocks in northwestern Pennsylvania and central New York, *in* Stratigraphic cross section of Paleozoic rocks—Colorado to New York: Am. Assoc. Petroleum Geologists Cross Sec. Pub. 4, p. 46-53, illus., **1966**. The section of Paleozoic rocks includes those of northwestern Pennsylvania. Cambrian to Pennsylvanian-aged rocks are included, and descriptions of some of the highlights are included. The facies depict a relatively stable shelf to the southeast and the shield to the north.

MELHORN, WILTON NEWTON, *see* Lounsbury, Richard William, 1.

MENSTER, MORRIS, *see also* Ergun, Sabri, 3.

1. (and Ergun, Sabri). A correlation between helium, density and hydrogen content of coals: *Fuel*, v. 39, no. 6, p. 509-510, illus., **1960**. Analyses of several types of coal from Pennsylvania are included. It can be shown that hydrogen content and specific volume are excellent criteria for degree of coalification of high rank coals.
2. (and O'Donnell, Hugh John, and Ergun, Sabri). X-ray scattering intensities of anthracites and meta-anthracites: *Fuel*, v. 41, no. 2, p. 153-161, illus., **1962**. Anthracite from Luzerne County, along with others from elsewhere, are used experimentally to show that the amount of graphitization can be shown by X-rays.

MERRILL, GLEN KENTON, *see also* Lane, H. Richard, 1.

1. Facies relationships in Pennsylvanian conodont faunas [western Pennsylvania] [abs.]: *Texas Jour. Sci.*, v. 14, no. 4, p. 418, **1962**.
2. Pennsylvanian platform-type conodonts from the Appalachian Cone-maugh [abs.]: *Geol. Soc. America Spec. Paper* 101, p. 139, **1968**.
3. Allegheny (Pennsylvanian) conodonts [western Pennsylvania]: PhD Thesis, Louisiana State Univ., **1968**; [abs.], *Dissert. Abs. B*, v. 29, no. 9, p. 3365B, **1969**.

MERRITT, GARY L., *see* Emrich, Grover Harry, 3.

METEORITICS.

1. Catalogue of the Leonard collection of meteorites: *Meteoritics*, v. 2, no. 1, p. 72-78, **1963**. Fragments of Mount Joy, from Adams County, are included.

METTICK, R. E., *see* Beck, Myrl Emil, 1.

MEYER, GERALD.

1. (and Wilmoth, Benton McMillan, Jr., and LeGrand, Harry Elwood). Availability of ground water in the Appalachian Region, *in* Water resources of the Appalachian Region, Pennsylvania to Alabama: U. S. Geol. Survey Hydrol. Invs. Atlas HA-198, sheet 10, scale, 1:2,500,000, text, **1965**. Most of Pennsylvania is in the least-favorable category with a

few most-favorable locations along the rivers where alluvial sands are present.

2. Geology and mineral resources of the region, in *Water resources of the Appalachian Region, Pennsylvania to Alabama*: U. S. Geol. Survey Hydrol. Invs. Atlas HA-198, sheet 3, scale, 1:2,500,000, text, **1965**. This is an extremely generalized summary of the region which includes all but southeastern Pennsylvania. Most of the emphasis is placed upon the lithology and mineral resources.

MEYER, HARVEY JOHN.

1. Petrography of the Catskill facies in three localities from central Pennsylvania, in *Symposium on Middle and Upper Devonian stratigraphy of Pennsylvania and adjacent states*: Pennsylvania Geol. Survey, 4th ser. Bull. G 39, p. 127-146, illus., **1963**. Details of sections from Lockport (Clinton County), New Buffalo (Perry County) and Red Roek (Luzerne County) are compared and analyzed statistically. The red and gray rocks all have a common source area, and, except for local sorting variations, the depositional environment of all three was similar.
2. Petrography of the [Devonian] Catskill Sandstone facies in central Pennsylvania: PhD Thesis, Pennsylvania State Univ., **1964**; [abs.], *Disser. Abs.*, v. 25, no. 11, p. 6540, **1965**.

MEYER, PIERREPONT ARTHUR, JR., *see* Brown, John Stafford, 1.

MEYERHOFF, ARTHUR AUGUSTUS.

1. Memorial to Joseph Poyer Deyo Hull, Jr. (1889-1967): *Am Assoc. Petroleum Geologists Bull.*, v. 52, no. 1, p. 174-175, port., **1968**.

MEYERHOFF, HOWARD AUGUSTUS.

1. New York's role in the Mesozoic and Tertiary evolution of the northern Appalachians, in *Geology of south-central New York*: New York State Geol. Assoc. Guidebook 35, p. 7-17, illus., **1963**. A summary of post-Paleozoic uplift and erosion includes many features from Pennsylvania. The major structural features influenced the post-Paleozoic drainage patterns. No evidence for a westward drainage is evident. Relict topography determined the drainage courses, and the divide was not necessarily at the eastern side of the state.

MIDDLETON, GERARD VINER.

1. Chemical composition of sandstones: *Geol. Soc. America Bull.*, v. 71, no. 7, p. 1011-1026, illus., **1960**. Sandstones from Pennsylvania and elsewhere are analyzed and classified into types based on theoretical tectonic setting. A sandstone from Hummelstown, Dauphin County, is classed as an example of one from an exogeosyncline.

MIDDLETON, WILLIAM S.

1. Benjamin Smith Barton [1766-1815]: *Annals of Medical History*, new ser. v. 8, p. 477-491, **1936**.

MIELCAREK, F. L.

1. Laurel Run Greenbriar Cave, Fayette County: *Netherworld News*, v. 9, no. 8, p. 150-151, illus., **1961**. *Speleo Digest* 1961, p. I63-I64, illus., **1963**.

MILLER, CHARLES, *see also* Gettel, Phillip E. A., 1.

1. The caves of York County: *York Grotto Newsletter*, v. 1, no. 9, p. 81-82, illus., **1960**.
2. (and Cline, William). Broken Bottle Cave [Franklin County]: *York Grotto Newsletter*, v. 3, no. 2, p. 27, 29, illus., **1961**; *Speleo Digest* 1961, p. I15, illus., **1963**.
3. (and Cline, William). Deerdorff Cave, [Franklin County]: *York Grotto Newsletter*, v. 3, no. 2, p. 26-28, illus., **1961**.
4. (and Cline, William). Paffenberger Caves, [Franklin County]: *York Grotto Newsletter*, v. 3, no. 3, p. 43-45, illus., **1961**; *Speleo Digest* 1961, p. I16-I17, illus., **1963**.
5. Mendes Cave [Franklin County]: *York Grotto Newsletter*, v. 4, no. 5, p. 68-69, illus., **1962**.
6. Mountain Green Cave [Franklin County]: *York Grotto Newsletter*, v. 4, no. 5, p. 70-71, illus., **1962**.
7. Overcash Cave no. 1 [no. 2, no. 3, no. 4], [Franklin County]: *York Grotto Newsletter*, v. 3, no. 9, p. 132-133, 134-135, illus., **1962**.
8. (and Rudisill, Harold). [Map of] Cleversburg Sink [Cave] [Cumberland County] extensions: *Speleo Digest* 1964, p. I12, **1966**.

MILLER, DAVID WILLIAM.

1. (and Geraghty, James Joseph, and Collins, Robert S.). *Water atlas of the United States—Basic facts about the nation's water resources*: Port Washington, Long Island, Water Inf. Center, 40 plates, texts, **1962**; 2nd edition, **1963**. An atlas of 40 maps shows the types of water resources available throughout the United States. Ground water occurs throughout Pennsylvania. Maps showing its chemistry and temperature are included.

MILLER, HAROLD ELLIS, JR.

1. A gravity survey in the Triassic lowlands, Berks and north Chester Counties: MS Thesis, Pennsylvania State Univ., **1963**.

MILLER, HAROLD W., JR.

1. (and Carey, J. B.). Soil associations and Susquehanna River Basin hydrology: *Jour. Soil and Water Conservation*, v. 21, no. 1, p. 18-20, illus., **1966**. [not seen].

MILLER, JOHN TINNEY.

1. Geology and mineral resources of the Loysville Quadrangle, [Cumberland, Juniata and Perry Counties] Pennsylvania: *Pennsylvania Geol. Survey*, 4th ser. Atlas A 127, [Bull. A 127], 47 p., illus. incl. geol. map, **1961**. A complete geological description of the area is given. Ordovician-Devonian rocks are mapped. Folds are the dominant structures. Stone

is the chief mineral resource, and small amounts of iron, copper, and fluorite are also present.

2. (and Conlin, Richard Renault). Upper Devonian rock stratigraphic nomenclature in Pennsylvania: *Am. Jour. Sci.*, v. 259, no. 10, p. 784-790, illus., **1961**. The name Susquehanna Group is proposed to include all rocks between the top of the red beds of the Catskill Formation and the top of the Hamilton Group. Later work will result in further subdivision.

MILLER, MARY H., *see* Thayer, Thomas Prentice, 1.

MILLER, PHILIP SAMUEL, *see* Ash, Simon Harry, 7.

MILLER, RICHARD D., *see also* Moore, Billy J., 1; Munnerlyn, R. D., 1.

1. (and Norrell, Geraldine P.). Analyses of natural gases of the United States, 1961: U. S. Bur. Mines Inf. Circ. 8221, 148 p., illus., **1964**. Gas from wells in Blair, Cameron, and Indiana Counties are analyzed along with other gases from other states.
2. (and Norrell, Geraldine P.). Analyses of natural gases of the United States, 1962: U. S. Bur. Mines Inf. Circ. 8239, 120 p., illus., **1964**. Gas from Bedford and Erie Counties is included.
3. (and Norrell, Geraldine P.) Analyses of natural gases of the United States, 1963: U. S. Bur. Mines Inf. Circ. 8241, 102 p. illus., **1965**. Gas from Westmoreland and Indiana Counties is analyzed along with much other gas from many other places.

MILLS, JOSEPH WILLIAM.

1. (and Eyrich, Henry T.). The role of unconformities in the localization of epigenetic mineral deposits in the United States and Canada: *Econ. Geology*, v. 61, no. 7, p. 1232-1257, illus., **1966**. The magnetite deposit at Boyertown, Berks County, is cited as an example of concentration in brecciated, fractured, and sheared zones as well as an ore body emplaced by an intrusion along an unconformity.

MINARD, JAMES PIERSON, *see* Owens, James Patrick, 1, 2.

MISER, HUGH DINSMORE, 1884-1969.

1. Memorial to George Willis Stose (1869-1960): *Geol. Soc. America Proc.* 1960, p. 143-149, port., **1962**.

MIYASHIRO, AKIBO.

1. Reginald Aldworth Daly (1871-1957)—A biography of a geologist [in Japanese]: *Earth Sci.*, no. 72, p. ii-iii, Tokyo, **1964**.

MODARRESI-GHAVANNI, HASSAN.

1. Statistical analysis applied to the petrographic and reservoir properties of the "First Venango oil sand", Warren County, Pennsylvania: MS Thesis, Pennsylvania State Univ., **1963**.
2. (and Griffiths, John Cedric). Relationship between reservoir properties and petrography of "First Venango Sand" [Warren County], in *Twenty-*

fourth Technical Conference on Petroleum Production, 1963: Pennsylvania State Univ. Mineral Industries Exper. Sta. Circ. 66, p. 251-278, illus., [1964]. Petrographic studies and statistical analyses of textural and compositional components from cores from the Grand Valley-Goodwill Hill field in Warren County show that expected models are significantly different from the estimated distributions of the various components. The silicious cementations are high, so is the porosity. Carbonate cement has the opposite effect.

3. Relationships of sedimentary bed forms, petrology, and hydraulic equivalence properties of an ancient [Pennsylvanian] point-bar sandstone deposit [Clearfield County]: PhD Thesis, Pennsylvania State Univ., 1968; [abs.], Dissert. Abs. B, v. 29, no. 12, p. 4715B-4716B, 1969.

MOLL, DAVID.

1. Refton Cave survey [Lancaster County]: Nittany Grotto News, v. 16, no. 7, p. 134-138, illus., 1968.

MONMONIER, MARK S.

1. Trends in upland accordance in Pennsylvania's Ridge and Valley section: Pennsylvania Acad. Sci. Proc. 1968, v. 42, p. 157-162, illus., 1969. Polynomial trend surfaces were fitted by least squares regression to samples of ridge tops and local broad uplands. They are both highly accordant, but since the accordance is related to the present major through-flowing streams, peneplanation as an explanation for the upland accordance is not necessary.

MONTGOMERY, ARTHUR.

1. Serpentine near Easton, [Lehigh County] Pennsylvania, in Northern field excursion guidebook—Internatl. Mineralog. Assoc., 3d Gen. Cong., Washington, D. C., 1962: [Washington, D. C., Mineralog. Soc. America] p. 24-27, illus., 1962. A brief, general description of the serpentine occurrence in William's quarry is given. The material is serpentized marble associated with the Franklin Gneiss. Details of mineral paragenesis are included.
2. The mineralogy of Pennsylvania, 1922-1965—Supplementing and updating Gordon's "The mineralogy of Pennsylvania (1922)": Acad. Nat. Sci. Philadelphia Spec. Pub. 9, 104 p., illus., 1969. Data are given on significant mineral discoveries, occurrences, and origin. A revised list of Pennsylvania minerals is included, as is descriptive mineralogy of newly-recorded minerals, and new data on earlier-reported minerals.

MONTGOMERY, DOUGLAS SARGENT, *see* King, Lewis H., 1.

MONTGOMERY, HUGH B.

1. Water supply problem of Lock Haven [Clinton County], Pa.: Am. Water Works Assoc. Jour., v. 53, no. 12, p. 1484-1492, illus., 1961. A brief description of the geology of the region is followed by an example of the placing of water wells so that they do not interfere with the

production of each other. Mines collect, contaminate and generate ground water also, and these must be taken into account. The wells should be located at the troughs of synclines.

2. Ground water supply for a state park in [York County] Pennsylvania: Am. Water Works Assoc. Jour., v. 54, no. 1, p. 68-74, illus., **1962**. Gifford Pinchot Park is underlain by Triassic igneous and sedimentary rocks. Sandstone would make the best source, and hornfels is the next best, as the sandstone is very limited and slightly metamorphosed. The wells are in the hornfels and none need be more than 150 feet deep.

MONTGOMERY, SONYA P.

1. Actinolite (byssolite) and stilpnomelane from French Creek [Chester County] Pennsylvania: MA Thesis, Bryn Mawr College, **1963**.

MOORE, BILLY J.

1. (and Miller, Richard D., and Shrewsbury, Raymond D.). Analyses of natural gases of the United States, 1964: U. S. Bur. Mines Inf. Circ. 8302, 144 p., illus., **1966**. Gas from one well in Bedford County is included.
2. (and Shrewsbury, Raymond D.). Analyses of natural gases of the United States, 1965: U. S. Bur. Mines Inf. Circ. 8316, 181 p., illus., **1966**. Fifty-five samples from wells throughout Pennsylvania are included.
3. (and Shrewsbury, Raymond D.). Analyses of natural gases, 1966: U. S. Bur. Mines Inf. Circ. 8356, 130 p., illus., **1967**. Forty-seven gas samples from many different wells in western Pennsylvania are included.
4. (and Shrewsbury, Raymond D.). Analyses of natural gases, 1967: U. S. Bur. Mines Inf. Circ. 8395, 187 p., illus., [**1968**]. Eleven samples from Pennsylvania are included among many others.

MOORE, ELLEN JAMES.

1. Conrad's Cenozoic fossil marine mollusk type specimens at the Academy of Natural Sciences of Philadelphia: Acad. Nat. Sci. Philadelphia Proc., v. 114, no. 2, p. 23-120, illus., **1962**.

MOORHOUSE, WALTER WILSON, 1913-1969.

1. Memorial to Elwood S. Moore (1878-1966): Geol. Soc. America Bull., v. 77, no. 12, p. P225-P231, port., **1966**.
2. Elwood, S. Moore [1878-1966]: Roy. Soc. Canada Minutes Procs., 4th ser. v. 6, p. 161-165, port., **1968**.

MORAN, STEPHEN R., *see* Gross, David L., 1.

MOREMAN, WALTER LAFAYETTE, *see* Gutschick, Raymond Charles, 1.

MOREY, ELSIE DARRAH, *see also* Darrah, Elsie L.

1. Transfer studies of Pennsylvanian *Pecopteris* compressions: Pennsylvania Acad. Sci. Proc., v. 41, p. 148-152, illus., **1967**. Numerous

specimens from western Pennsylvania and elsewhere are used to show that the recognition of certain specific characters of the genus can be detected by acetate transfer peels. Such details are critical in separating species because the genus is such an important stratigraphic marker.

MORISAWA, MARIE ETHEL.

1. Quantitative geomorphology of some watersheds in the Appalachian Plateau: Geol. Soc. America Bull., v. 73, no. 9, p. 1025-1046, illus., **1962**. The western plateau region of Pennsylvania is included. Analysis of the quantitative geomorphic characteristics of the watersheds tends to confirm Horton's laws of drainage composition for stream numbers, lengths, and areas, but not for vertical components. Explanations are offered.
2. Distribution of stream-flow direction in drainage patterns: Jour. Geology, v. 71, no. 4, p. 528-529, illus., **1963**. Deviations from a predicted drainage pattern developed on the Wissahickon Schist in the Philadelphia area are attributed to foliation.
3. Quantitative study of the influence of foliation on drainage nets in the Piedmont [southeastern Pennsylvania] [abs.]: Geol. Soc. America Spec. Paper 73, p. 14, **1963**.

MORRIS, DAVID ALBERT.

1. Lower Conemaugh (Pennsylvanian) depositional environments and paleogeography in the Appalachian coal basin, 2 vols.: PhD Thesis, Univ. Kansas, **1967**; [abs.], Dissert. Abs. B, v. 28, no. 9, p. 3754B, **1968**; Geol. Soc. America Spec. Paper 101, p. 144, **1968**.

MORRISON, ANNE K., *see* Dennison, John Manley, 3.

MOSES, R. G., *see* Spackman, William, 1.

MOSS, JOHN HALL, *see also* Cadwell, D. H., 1; Potter, Noel, Jr., 1; Werner, Mathew L., 1.

1. (and Boekenkamp, Richard P.). Revision of the Pennsylvania Earth and Space Science course: Jour. Geol. Education, v. 16, no. 5, p. 184-185, **1968**. A summary of the Earth and Space Science course taught in the Pennsylvania high schools is followed by planned changes to accommodate changing circumstances.

MOXHAM, ROBERT MORGAN, *see also* Greene, Gordon William, 1.

1. (and Greene, Gordon William, and Harvey, Arnold H.). Aerial and bore-hole thermal surveys at coal mine fires, Pa. [abs.]: Mining Engineering, v. 19, no. 12, p. 35, **1967**.

MUEHLENBERGER, WILLIAM RUDOLF, *see also* Bayley, Richard William, 1.

1. (and Denison, Rodger Espy, and Lidiak, Edward George). Basement rocks in continental interior of United States: Am. Assoc. Petroleum Geologists Bull., v. 51, no. 12, p. 2351-2380, illus., **1967**. Buried

basement rocks from more than 3,000 wells (none of which were in Pennsylvania) permit an evaluation of Precambrian history of the United States, including Pennsylvania. The state is not included on the map showing the minimum size of North America 2,500 my ago nor 1,700 my ago, but is included at 1,350 my and 1,000 my ago.

MULLER, ERNEST HATHAWAY.

1. Reduction of periglacial erosion surfaces as a measure of the effectiveness of glacial erosion, in *Internatl. Assoc. Quaternary Research*, 6th, Rept., v. 3: Lodz, Poland, Panstwowe Wydawnictwo Nauk. Oddzial w Lodzi, p. 233-243, illus., **1963**. The influence of glaciers on erosion and weathering is studied by examining an area in northwestern Pennsylvania which is below the glacial moraine and an area above the moraine in New York. It is evident that glaciation altered the landscape without destroying all traces of preglacial topography.

MUNNERLYN, R. D.

1. (and Miller, Richard D.). Helium-bearing natural gases of the United States—Analyses, second supplement to Bulletin 486: U. S. Bur. Mines Bull. 617, 93 p., illus., **1963**. Gas from one well in Lackawanna County is analyzed. It contains 0.1 molepercent helium and is 91.0 percent methane.

MURPHY, JAMES L.

1. The Pennsylvanian nautiloid *Kionoceras ungeri* (Sturgeon and Miller): *Jour. Paleontology*, v. 40, no. 6, p. 1388-1390, illus., **1966**. Specimens from the Vanport Limestone, Pennsylvanian, in Beaver County, are described and illustrated.

MURPHY, RICHARD E.

1. [Map of] Landforms of the world: Scale, 1 inch to about 750 miles—*Assoc. Am. Geographers Map Supp.* 9: *Assoc. Am. Geographers Annals*, v. 58, no. 1, text, p. 198-200, **1958**.

MURPHY, THOMAS DANIEL.

1. Distribution of silica resources in eastern United States: *U. S. Geol. Survey Bull.* 1072 L, p. 657-665, illus., **1960**. Maps show the distribution of silica sources (over 85% pure). Quartzite, quartz-mica schist, sand, sandstone, gravel, and conglomerate are included. Their geologic distribution is plotted.

MURPHY, ZANE E., *see* deCarlo, Joseph Anthony, 1.

MURRAY, GROVER ELMER.

1. Geology of the Atlantic and Gulf coastal province of North America: New York, Harper and Bros., 692 p., illus., **1961**. A comprehensive description of the geology of the Coastal Plain includes that portion in the extreme southeastern part of Pennsylvania. The pre-Coastal Plain geology is described; only Cretaceous and Pleistocene rock are present.

MURRAY, MARION.

1. Hunting for fossils—A guide to finding and collecting fossils in all fifty states: New York, The MacMillan Co., 348 p., illus., 1967. A popular account of the origin and occurrence of fossils includes also a very cursory and incomplete discussion of fossil-collecting locations in all the states, including Pennsylvania.

MYERS, DEL.

1. Buffalo Run Cave . . . Centre County: Nittany Grotto News, v. 16, no. 3, p. 54-55, illus., 1967.

MYERS, PAUL BENTON, JR.

1. (and Ryan, John Donald). Uraniferous black shales in the Triassic of [southeastern] Pennsylvania [abs.]: Pennsylvania Acad. Sci. Proc., v. 33, p. 350, 1963.
2. Development of the Hamburg Klippe in the Bernville-Strausstown area, [Berks County] Pennsylvania [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 4, p. 55-56, 1969.

MYERS, RICHMOND ELMORE.

1. A Pennsylvania state mineral: Pennsylvania Acad. Sci. Proc., v. 34, p. 140-146, 1960. A prominent mineral (or fossil or economic product) for each county is listed. No one seems appropriate for the entire state.
2. Pennsylvania geology manual: Cedar Grove, New Jersey, Phillips Campbell Pub. Co., 36 p., 1964 [not seen].

MYERSON, BERTRAM L.

1. A study of mineralization in the vicinity of Jim Thorpe, Carbon County, Pennsylvania: MS Thesis, New York Univ., 1955.

NAGLE, J. STEWART.

1. Wave and current orientation of shells [northeastern Pennsylvania]: Jour. Sed. Petrology, v. 36, no. 4, p. 1124-1138, illus., 1967. The Devonian Mahantango Formation was deposited by waves moving from the SSE. Waves removed much of the bedding. The lower part of the Devonian Fort Littleton Formation is current deposited, below wave base, and the upper part of the Fort Littleton is wave-deposited.

NAGY, BARTHOLEMEW STEPHEN, *see* Bitz, Sister Mary Carol, 1.

NANDI, S. P.

1. (and Walker, Philip Leroy, Jr.). Diffusion of argon from coals of different rank, [Chapter] 23, in Coal science—Advances in chemistry, v. 55: Washington, D.C., Am. Chemical Soc., p. 379-384, illus., 1966; discussions, p. 384-385. Coals from Pennsylvania and elsewhere are used to show that the micropores in coals closely approach the size of argon atoms.

NATOFF, NORA CAROL, *see* Bromery, Randolph Wilson, 39, 42, 48, 49, 54.

NATURE.

1. Obituaries—Professor Harry Hammond Hess [1906-1969]: *Nature*, v. 224, no. 5217, p. 393, **1969**.

NELSON, ARNOLD.

1. GAF Corporation quarries, Charmian [Adams and Franklin Counties], in *The geology of mineral deposits in south-central Pennsylvania—Field Conf. Pennsylvania Geologists*, 33rd: Harrisburg, Pennsylvania Bur. Topog. and Geol. Survey, p. 6-10 illus., **1968**. A quarry of greenstone (meta-basalt) is visited. The material is used for roofing granules, and is part of a complex of altered Precambrian volcanic rocks commonly considered the Catoctin Formation. Southeast-dipping regional flow cleavage is the obvious structure. The mineralogy and petrology of the rock is described. Another quarry in Weverton Quartzite, Cambrian, is present at Buzzard's Roost. Similar folds comprise the structure. Both materials are used for roofing granules, but the former material is superior.

NELSON, B. N.

1. Hillside Bone Cave (Westmoreland County, Pennsylvania): *Speleo Digest* 1960, p. I60-I61, illus., **1962**.
2. Ken's Cave (Westmoreland County, Pennsylvania): *Speleo Digest* 1960, p. I61-I62, illus., **1962**.

NELSON, J. G.

1. Pre-Illinoian glacialiation in central Pennsylvania: *Canadian Geographer*, v. 7, no. 3, p. 145-147, illus., **1963**. Detailed analysis of the Milton and Charlton deposits result in their being identified as glacial till deposits (and not colluvium). If so, these would be pre-Illinoian in age.
2. Some effects of glacialiation on the Susquehanna River valley [northern Pennsylvania]: *Assoc. Am. Geographers Annals*, v. 55, no. 3, p. 404-448, illus., **1965**. Particle analysis, mapping, flooding effects, Olean glacialiation, the size of the glacial Susquehanna, and deglacial processes are investigated. The glacial Susquehanna may not have been appreciably larger than it is now.
3. Man and geomorphic process in the Chemung River Valley, New York and [northern] Pennsylvania: *Assoc. Am. Geographers Annals*, v. 56, no. 1, p. 24-32, **1966**. Evidence that the flooding effects of the Chemung River have accelerated are presented, and the cause is attributed to human activity effecting the sediment load.

NELSON, RICHARD, *see also* Breisoh, Richard L., 1.

1. Snake Cave [Centre County]: *Nittany Grotto News* v. 12, no. 2, p. 48-49, illus., **1963**.

NEWBERRY, JOHN STRONG, 1822-1892.

1. New species and new genus of American Palaeozoic fishes, together with notes on the genera *Oracanthus*, *Dactylodus*, *Polyrhizodus*, *Sandalodus*,

Deltodus: New York Acad. Sci. Trans., v. 16, p. 282-304, illus., **1897**. *Ctenodus fleischeri* from the Devonian Chemung Formation in Bradford County is described and illustrated as is *C. [Sagenodus] augustus* from the same place.

NEWELL, MARCIA F., *see* Rankin, Douglas Whiting, 1.

NEWELL, WAYNE L.

1. (and Wise, Donald Underkoffler). Independent joint system superimposed on metamorphic fabric of Glenarm Series near Coatesville, [Chester County] Penna.: Pennsylvania Acad. Sci. Proc., v. 38, no. 2, p. 150-153, illus., **1965**. Over 500 joints were measured in the Mortonville area. Steep sets are identical in six sub-areas of markedly different metamorphic fold patterns and are associated with the youngest S-surfaces or kink planes.

NEWHOUSE, WALTER HARRY.

1. (and Callahan, William Henry). Two kinds of magnetite? Econ. Geology, v. 22, no. 5, p. 629-632, **1927**. Brownish magnetite, the result of oxidation and replacement of bluish magnetite, is reported from Cornwall, Lebanon County, where it may be a product of hypogene solutions.

NEWMAN, WILLIAM LOUIS, *see* McKnight, Edwin Thor, 1, 2, 3.

NICHOLAS, BROTHER GERAROUS.

1. Ralph W[alter] Stone, 1876-1964: Netherworld News, v. 12, no. 6, p. 75-77, **1964**.

NICHOLLS, PERCY.

1. (and Selvig, Walter Alfred, and Ricketts, Edwin Burnley). Clinker formation as related to the fusibility of coal ash: U. S. Bur. Mines Bull. 364, 71 p., illus., **1932**. In an otherwise purely engineering account of fuel properties are included numerous proximate and ultimate analyses of coal samples from western Pennsylvania.

NICKELSEN, RICHARD PETER.

1. Fold patterns and continuous deformation mechanisms of the central Pennsylvania folded Appalachians, *in* Tectonics and Cambrian-Ordovician stratigraphy in the central Appalachians of Pennsylvania—Pittsburgh Geol. Soc. and Appalachian Geol. Soc., Field Conf., 1963, Guidebook: Pittsburgh, Pittsburgh Geol. Soc., p. 13-29, illus., **1963**. Folds of at least 4 different orders of size are identified and discussed; structural-lithic units are defined in that the lithology of the rocks influences the nature of the deformation. The Appalachians here are dominated by the Pennsylvania Culmination and the Anthracite Depression. Origins and subdivisions of these features are discussed.
2. Fossil distortion and penetrative rock deformation in the Appalachian

Plateau, [western] Pennsylvania: Jour. Geology, v. 74, no. 6, p. 924-931, illus., 1966. The brachiopod *Lingula carbonaria* is distorted by as much as 10 percent shortening in the NW-SE direction. The deformation of the fossils occurred during the first episode of lateral tectonism during which time the rocks underwent lateral compaction before beginning major folding.

3. (and Hough, Van Ness D.). Jointing in the Appalachian Plateau of [western] Pennsylvania: Geol. Soc. America Bull., v. 78, no. 5, p. 609-629, illus., 1967; discussion with title, Jointing in south-central New York, by John Mason Parker, 3rd, v. 80, no. 5, p. 919-922, illus., 1969; reply by authors, p. 923-925. Joints in shales and coals are recorded. The basic *fundamental joint system* is an orthogonal systematic and non-systematic set of joints. Complex systems result from overprinting of one set on another. The joint pattern of the region is cumulative, presenting a record of all events which have produced joints. The systematic joints are early, independent of folds and are of extensional origin. Later, non-systematic joints formed as extension features after compression.

NICKEY, DAVID ALLEN.

1. Ostracodes from the Middle Ordovician Nealmont Limestone of central Pennsylvania: PhD Thesis, Pennsylvania State Univ., 1966; [abs.], Dissert. Abs. B, v. 28, no. 3, p. 948B, 1967.

NICOLAY, H. H.

1. (and Stone, A. V.). Rocks and minerals—A guide for collectors of the eastern United States: New York, A. S. Barnes and Co., 255 p., illus., 1967. This is a popular account of some common rocks and minerals and good collecting places in Pennsylvania and other states.

NITTANY GROTTO.

1. Lane's Lead Pit [Cave] (Bedford County, Pennsylvania): Speleo Digest 1964, p. 17, 18, illus., 1966.

NORRELL, GERALDINE P., see Miller, Richard D., 1, 2, 3.

NORTH AMERICAN GEOLOGIC MAP COMMITTEE.

1. Geologic map of North America: Washington, D. C., U. S. Geol. Survey, 2 sheets, scale, 1:5,000,000, revised, 1965.

NORTON, DORITA ANNE.

1. (and Clavan, Walter S.). The optical mineralogy, chemistry, and X-ray crystallography of ten clinopyroxenes from the [Chester County] Pennsylvania-Delaware Piedmont province: Am. Mineralogist, v. 44, no. 5, p. 844-874, illus., 1959; discussion by G. Malcolm Brown with title, The Gm and Fe⁺² contents of pyroxenes from the Pennsylvania and Delaware Piedmont province—A reinterpretation; v. 47, nos. 1-2, p. 170-171, 1962. Theoretical considerations and the presence of persistent

unidentified reflections on diffractometer curves suggest that chemically complex clinopyroxenes are substructurally different from diopside. The samples are of igneous origin, and subsequent metamorphism has changed them

NORTON, JAMES JENNINGS, *see* Griffiths, Wallace Rush, 1

NORTON, MATTHEW FRANK.

1. Appalachian tectonics: Internatl. Geol. Cong., 21st., Proc. Sec. 18, p. 69-80, illus., **1960**. Two main fold directions are recognized, the first, parallel to the trend of the Appalachians, and the second, post-Triassic, normal to the others and resulting in the conspicuous bend in the Appalachians in Pennsylvania. Movement of basement blocks caused the folding in the sedimentary cover.

NUTTALL, THOMAS, 1786-1859

1. A journal of travels into the Arkansas Territory, during the year **1819 . . .**: Philadelphia, T. H. Palmer, 1821. Part of the journey is from Philadelphia to Pittsburgh and westward via the Ohio River. Geological observations are made *en route*, and most are very descriptive.

NUTTER, LARRY J.

1. Stratigraphy of the [Devonian] Newton Hamilton Formation of south-central Pennsylvania: MS Thesis, Univ. Minnesota, **1962**.

OAKES, MALCOLM CHRISTIE.

1. Hugh Dinsmore Miser, 1884-1969: Oklahoma Geol. Notes, v. 29, no. 5, p. 129-130, port., **1969**.

O'BRYAN, DERIC, *see also* Barksdale, Henry Compton, 2.

1. Accumulative effects of drought on hydrology of northeastern states [abs.]: Geol. Soc. America Spec. Paper 115, p. 283, **1968**.

O'BRIEN, NEAL RAY, *see* Smith, William Henking, 1.

O'DONNELL, HUGH JOHN, *see* Ergun, Sabri, 3; Mentser, Morris, 2.

OGDEN JAMES GORDON, 3d.

1. Radiocarbon and pollen evidence for a sudden change in climate in the Great Lakes region approximately 10,000 years ago, *in* Quaternary paleoecology: New Haven, Yale Univ. Press, p. 117-127, illus., **1967**. Samples from Pymatuning Lake, Crawford County and elsewhere are analyzed to show a change in vegetation type which reflects the climate. Radiocarbon dates show the age of the change to be 9,310 B. P. at Pymatuning Lake.
2. (and Hay, Ruth J.). Ohio Wesleyan University natural radiocarbon measurements IV: Radiocarbon, v. 11, no. 1, p. 137-149, **1969**. Peat from beneath glacial gravels near Titusville, Crawford County, is dated 33,050 B. P. and > 37,500.

OHIO JOURNAL OF SCIENCE.

1. James Franklin Pepper [1898-1963]: *Ohio Jour. Sci.*, v. 65, no. 4, p. 238, **1965**.

OHOTNICKY, RAYMOND EDWARD.

1. Heavy mineral residue and feldspar content of the Paleozoic rocks occurring along the Pennsylvania Turnpike: MS Thesis, Miami Univ., **1958**.

OIL AND GAS JOURNAL.

1. Pennsylvania's deep potential: *Oil and Gas Jour.*, v. 57, no. 41, p. 236-238, illus., **1959**. In an exhortation for petroleum and gas drilling into Lower Devonian rocks, numerous examples of production from Pennsylvania are cited along with scattered bits of geological data.
2. Sixty-six wells show Pennsylvania's deep potential: *Oil and Gas Jour.*, v. 57, no. 41, p. 236-238, illus., **1959**. The Rockton gas field in Clearfield County is described as an example of deep (pre Middle Devonian) production which is possible. Other locations are also cursorily described.
3. Big 1959, even better for Keystoneers: *Oil and Gas Jour.*, v. 58, no. 15, p. 185-189, illus., **1960**. This is a general survey of the recent discoveries of oil and gas fields in the state. New fields in Erie, Crawford, Potter, Somerset, and Fayette Counties are described.
4. Gas prospects underlie the revival of Pennsylvania: *Oil and Gas Jour.*, v. 59, no. 17, p. 119-122, illus., **1961**. A general discussion of the potential occurrence of gas in various lower Paleozoic sandstones is given as part of an exhortation for deep drilling in the western part of the state.
5. Pennsylvania drillers dig deep for gas completion [western Pennsylvania]: *Oil and Gas Jour.*, v. 60, no. 43, p. 172-174, **1962**. In a general summary of oil and gas drilling in the western part of the state are included various references to geological information, mostly of pre-Devonian rocks.
6. Pennsylvania setting new wildcatting records in '64 [western Pennsylvania]: *Oil and Gas Jour.*, v. 62, no. 12, p. 132-135, illus., **1964**. In general description of oil and gas drilling activity, some geological information is included. Deep sand (pre Devonian) rocks are encountered and described.

OKUMA, A. F.

1. Geology and mineral resources of Path Valley, Franklin County, Pennsylvania: MS Thesis, Pennsylvania State Univ., **1968**.

OLES, FLOYD.

1. (and Oles, Helga). Pennsylvania, in *Eastern gem trails—A guide to the most attractive and productive gem and mineral collecting areas of central-eastern United States*: Mentone, California, Gembooks, p. 25-35, illus., **1967**. Popular accounts of mineral-collecting locations in Pennsylvania, mostly in the southeastern portion, are included.

OLES, HELGA, *see* Oles, Floyd, 1.

OLIVER, JACK ERTLE.

1. (and Kovach, Robert L., and Dorman, Henry James). Crustal structure of the New York-Pennsylvania area: Jour. Geophys. Research, v. 66, no. 1, p. 215-225, illus., **1961**. Those studies of Rayleigh waves suggest a low velocity sedimentary layer overlying two crustal rock layers which in turn overlie the mantle. The total crust thickness is about 37 km. The Pennsylvania station for a tripartite array is in Waynesburg.

OLIVER, WILLIAM ALBERT, JR.

1. A new species of the rugose coral genus *Nalivkinella* from the Middle Devonian of [Monroe County] eastern Pennsylvania: Jour. Paleontology, v. 38, no. 5, p. 866-876, illus., **1964**. *Nalivkinella echoense* from the Marcellus Shale near Echo Lake, Monroe County, is described and illustrated. The allometric growth is illustrated and discussed.
2. (and deWitt, Wallace, Jr., and Dennison, John Manley, and Hoskins, Donald Mortimer, and Huddle, John Warfield). Devonian of the Appalachian Basin, United States, in International Symposium on the Devonian System, v. 1: Calgary, Alberta Soc. Petroleum Geologists, p. 1001-1040, illus., **1967**. A complete survey of the stratigraphy, sedimentation, tectonics, and economic geology of the Appalachian Basin, including Pennsylvania, is given. Small-scale isopach and lithofacies maps are included.
3. Succession of rugose coral faunas in the Lower and Middle Devonian of eastern North America, in International Symposium on the Devonian System, v. 2: Calgary, Alberta Soc. Petroleum Geologists, p. 733-744, illus., **1967**. Corals from the Coeymans Limestone in Monroe County are listed and shown to be part of a widespread fauna of Helderbergian age.
4. (and deWitt, Wallace, Jr., and Dennison, John Manley, and Hoskins, Donald Martin and Huddle, John Warfield). Correlation of Devonian rock units in the Appalachian Basin: U. S. Geol. Survey Oil and Gas Invs. Chart OC-64, 1 sheet, text, **1969**. Devonian rocks from many places in the state are correlated with others throughout the Appalachian area.

OLMSTED, FRANKLIN HOWARD, *see also* Hely, Allen Grant, 1; Parker, Garald Gordon, 1.

1. (and Parker, Garald Gordon, and Keighton, Walter Barker, Jr., and Perlmutter, Nathaniel Matthew, and Cushman, Robert Vittum). Ground-water resources of the Delaware River service area—App. N., General geology and ground water, in Delaware River Basin, New York, New Jersey, Pennsylvania, and Delaware: U. S. Cong., 87th, 2d sess., House Doc. 522, v. 7, 155 p., illus., tables, **1962**. A generalized summary of the geology of eastern Pennsylvania is included, with special emphasis being on the ground-water occurrence. Analyses of ground-water are included as are many maps and tables.

2. (and Hely, Allen Grant). Relation between ground-water and surface water in Brandywine Creek basin, [southeastern] Pennsylvania: U. S. Geol. Survey Prof. Paper 417 A, p. A1-A-21, illus., **1962**. About two-thirds of the runoff in the creek is base-flow from the ground-water in the crystalline rocks. The ground-water yield of the bedrock is very small, however. The explanations for the anomaly are given.

OLSEN, EDWARD JOHN, *see* Harback, Henry, 1.

OLSON, JERRY CHIPMAN.

1. (and Adams, John Wagstaff). Thorium and rare earths in the United States, exclusive of Alaska and Hawaii: U. S. Geol. Survey Mineral Invs. Resource Map MR 28, scale, 1:3,168,000, separate text, **1962**. Thorium-rich uranium minerals from Lehigh County and rare-earth-bearing monazite from Delaware County are noted.

OLSON, WALTER S.

1. Thomas Carroll Wilson (1906-1969): Am. Assoc. Petroleum Geologists Bull., v. 53, no. 12, p. 2562-2563, port., **1969**.

ONDRICK, CHARLES WILLIAM, *see* Griffiths, John Cedric, 7.

O'NEILL, BERNARD J., JR.

1. Atlas of Pennsylvania's mineral resources—Part 1, Limestones and dolomites of Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. M 50, 40 p., illus. incl. geol. maps, **1964**. A general discussion of the occurrence of limestone and dolomite in the state is followed by numerous maps showing the locations of the rocks with discussions of their specific uses.
2. (and others). Properties and uses of Pennsylvania shales and clays: Pennsylvania Geol. Survey, 4th ser. Bull. M 51, 448 p., illus., **1965**. A discussion of the origin, distribution, and geological occurrence of clays and shale throughout the state is followed by chemical analyses. Discussions of applications are included also.

ONG, H. LING.

1. (and Swanson, Vernon Emanuel). Adsorption of copper by peat, lignite, and bituminous coal: Econ. Geology, v. 61, no. 7, p. 1214-1231, illus., **1966**. Coal from near Pittsburgh, Allegheny County, is included in tests. Various variables were examined and high copper contents can be explained by an adsorption process from natural percolating waters.

OPDYKE, NEIL D., *see also* Irving, Edward 2; Knowles, Raymond Robert, 3; Roy, Jean L., 2.

1. The paleomagnetism of the New Jersey Triassic—A field study of the inclination error in red sediments: Jour. Geophys. Research v. 66, no. 6, p. 1941-1949, illus., **1961**; discussion by D. H. Griffiths and R. F. King, no. 12, p. 4320. A measurement on a sample of the Haycock Sill, Bucks County is included with many others from New Jersey. The mean direction of this and other intrusives is $D = 350.5^\circ$, $I = + 34.6^\circ$. There is no significant difference in the paleomagnetic directions from intrusives, extrusives, or sediments.

ORANGE, ARNOLD, *see* Lahman, Howard S., 1.

ORLOPP, DONALD EASTON, *see* Wanless Harold Rollin, 2.

ORTUGLIO, C., *see* Wolfson, David E., 1.

OSBORN, C. C., *see* Soper, Edgar Kirke, 1.

OSBORNE, FRELEIGH FITZ.

1. [Jean Etienne] Geuttard's map of Canada and Louisiana, a geologic first: *Naturaliste Canadienne*, v. 95, no. 6, p. 1189-1193, illus., **1968**. This early map printed in 1752 is largely geographic but does contain geological notes, a few from Pennsylvania.

OTTE, MARY E., *see* Thomson, Robert D., 1, 2, 3, 4; Yeloushan Charles C., 1.

OVERBEY, WILLIAM K., JR., *see also* Whieldon, Charles E., Jr., 2.

1. (and Evans, Donald M.). Appalachian region oilfield reservoir investigations, Dewdrop, Bradford Third, Lewis Run, and Sortwell Sands, Sortwell Field, Annin Township, McKean County, Pa.: *Producers Monthly*, v. 28, no. 11, p. 24-27, illus., **1964**. The sands from a core are analyzed geologically and petrographically in an otherwise engineering report on the reservoir properties and potentialities of the Devonian sandstones.
2. (and Evans, Donald M.). Appalachian region oilfield reservoir investigations, Glade Sand, Youngsville pool, Youngsville-Sugar Grove oilfield, Brokenstraw Township, Warren County, Pa.: *Producers Monthly*, v. 29, no. 8, p. 14-16, illus., **1965**. Core analyses and oil-production data are presented. Attempts to orient fractures in the core-well with those of an offset well are also discussed. Comparisons of the core with geophysical data are also included.
3. (and Rough, Robert L.). Surface studies predict orientation of induced formation fractures in Appalachian area: *Producers Monthly*, v. 32, no. 6, p. 16-19, illus., **1968**; *Am. Petroleum Inst. Drilling and Production Practice* 1968, p. 101-106, illus., **1969**. Bearings of major vertical joints in Salamanaca Sandstone outcrop exposures in the Bradford oilfield in McKean County, were compared favorably with fracture directions induced in subsurface formations by hydraulic fracturing.

OWENS, JAMES PATRICK.

1. (and Minard, James Pierson). Pre-Quaternary geology of the Bristol Quadrangle, New Jersey—[Bucks County] Pennsylvania: U. S. Geol. Survey Geol. Quad. Maps of the U. S., Map GQ 342, scale, 1:24,000, **1964**. Only the flat-lying Cretaceous Raritan Formation underlies the Bucks County portion of the quadrangle.
2. (and Minard, James Pierson). Pre-Quaternary geology of the Trenton East Quadrangle, New Jersey—[Bucks County] Pennsylvania: U. S. Geol. Survey Geol. Quad. Map of the U. S., Map GQ 341, scale, 1:24,000,

1964. Only the flat-lying Cretaceous Raritan Formation underlies the Pennsylvania portion of the quadrangle.

OXBURGH, URSULA M., *see* Holland, Heinrich Dieter, 2.

PACHMAN, JERROLD MARVIN.

1. Inter-relationships among petrographic, textural, and oil-reservoir properties in the [Devonian] Chipmunk Sand [northern Pennsylvania]: PhD Thesis, Pennsylvania State Univ., **1961**; [abs.], Dissert. Abs., v. 22, no. 2, p. 591, **1961**.

PAGE, LELAND VERNON.

1. (and Seaber, Paul Robert). Water-resources investigations and reports in the Susquehanna River Basin [central Pennsylvania]: U. S. Geol. Survey Repts. Open File, **1962** [not seen].

PAGE, R. C., *see* Johnson, G. C., 1.

PALACAS, JAMES GEORGE, *see* Swain, Frederick Morrill, Jr., 4.

PARIZEK, RICHARD RUDOLPH, *see also* Dutcher, Russell Richardson, 1, 2; Lattman, Lawrence Harold, 5; Siddiqui, Shams H., 1.

1. (and Drew, Lawrence J.). Random drilling for water in carbonate rocks, in Proceedings of the sixth annual international symposium on computers and operations research, v. 3, part PP: Pennsylvania State Univ. Mineral Industries Exper. Sta. Spec. Pub. 2-65, 22 p., illus., **1966**; Pennsylvania State Univ. Inst. Research on Land and Water Resources, Pub. 3-66, **1966**. Statistical analyses of water-well operation in Centre County are designed to determine the influence of known factors (in this case fracture traces) on the production of the wells.
2. (and Drew, Lawrence J., and Bauer, John W.). Factors influencing streamflow variability of rivers draining folded carbonate terranes [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 7, p. 169, **1969**.
3. Permeability development in folded and faulted carbonates [central] Pennsylvania [abs.]: EOS, v. 50, no. 4, p. 155, **1969**.

PARK, CHARLES FREDERICK, JR.

1. Memorial to Adolph Knopf (1882-1966): Geol. Soc. America Proc. 1966, p. 261-266, port., **1968**.

PARKER, GARALD GORDON, *see also* Olmsted, Franklin Howard, 1.

1. (and Hely, Allen Grant, and Keighton, Walter Barker, Jr., and Olmsted, Franklin Howard, and others). Water resources of the Delaware River Basin: U. S. Geol. Survey Prof. Paper 381, 200 p., illus., **1964**. A generalized description of the geology of eastern Pennsylvania includes discussions of all of the rocks, with emphasis upon the water-bearing properties. Rainfall, groundwater, and surface water are discussed; analyses are included.

PARKER, JOHN MASON, 3D, *see* Nickelsen, Richard Peter, 3.

PARKER, RAYMOND LAURENCE.

1. Niobium and tantalum in the United States, exclusive of Alaska and Hawaii: U. S. Geol. Survey Mineral Invs. Resource Map MR 36, scale, 1:3,168,000, separate text, **1962**. These elements are reported from euxenite-bearing pegmatites near Chester, in Delaware County.

PARRILLO, DANIEL G., *see* Depman, Albert Joseph, 2.

PARSONS, WILLARD HALL.

1. John Reed Moseley, 1900-1959: Jour. Geol. Education, v. 8, no. 1, p. 40, **1960**.

PASTER, THEODORE P.

1. Origin of the Appalachian Mountains [abs.]: Geol. Soc. America Spec. Paper 115, p. 493, **1968**.

PATTEN, EUGENE PALTENGHI, JR., *see* Bennett, Gordon D., 1.

PATTERSON, ELMER DAVISSON, *see also* Van Lieu, Junius Adrian, 1.

1. Ellipsoidal structures in dark-gray shale in [Butler and Clarion Counties] western Pennsylvania [abs.]: Geol. Soc. America Bull., v. 71, no. 12, pt. 2, p. 2023, **1960**.
2. (and Van Lieu, Junius Adrian). Geologic map of Butler County, Pennsylvania: U. S. Geol. Survey Repts. Open File, **1962** [not seen].
3. Coal resources of Beaver County, Pennsylvania: U. S. Geol. Survey Bull. 1143-A, p. A1-A33, illus. incl. geol. map, **1963**. Only Pennsylvania rocks are present, which include eight distinctive coal beds and a total of 21. Almost 2,500 million tons of bituminous coal remain in reserve. Analyses are included.
4. (and Van Lieu, Junius Adrian). Coal resources of Butler County, Pennsylvania: U. S. Geol. Survey Repts. Open File, 71 p., illus. incl. geol. map, **1969**. Coal-bearing Pennsylvanian rocks are 830 feet thick. There are eleven coal beds which originally contained 3,678 million tons of coal, of which about 222 million have been removed. Of the remainder, 15 percent would be easily strippable, and about 25 percent is within 100 feet of the surface.

PATTERSON, SAM HUNTING, *see* Huddle, John Warfield, 1.

PATTERSON, SAMUEL OLIVER.

1. (and Bossart, Paul Nathaniel, Jr.). The use and effectiveness of geophysical prospecting in the Appalachian area [abs.]: Am. Petroleum Inst. Proc. 1960, v. 40, sec. 4, p. 20-21, **1960**.

PAUL, CHRISTOPHER R. C., *see* Kesling, Robert Vernon, 1.

PAVLIDES, LOUIS, *see also* Crittenden, Max Dermont, Jr., 1.

1. (and Boucot, Arthur James, and Skidmore, Wilfred Brian). Stratigraphic evidence for the Taconic orogeny in the northern Appalachians, in *Studies of Appalachian geology—northern and maritime*: New York, Interscience Publishers, p. 61-82, illus., **1968**. Evidence from Pennsylvania is included in a regional discussion of the Taconic orogeny. Evidence ranges from angular unconformity in eastern Pennsylvania through disconformity with the Silurian westward, in central Pennsylvania, to conformity with the Silurian in western Pennsylvania.

PEARL, RICHARD MAXWELL.

1. *American gem trails*: New York, McGraw Hill Book Company, 173 p., illus., **1964**. A popular account of gems and their occurrence include a few references to those in Pennsylvania, mostly in the southeastern portion.

PEARRE, NANCY C.

1. (and Heyl, Allen Van, Jr.). Chromite and other mineral deposits in serpentine rocks of the Piedmont Upland, Maryland, [southeastern] Pennsylvania, and Delaware: U. S. Geol. Survey Bull. 1082-K, p. 707-833, illus. incl. geol. maps, **1960**. High-grade, massive, and low-grade disseminated chromite occurs in irregular and unpredictable form in the serpentines of southern Lancaster and Chester Counties. The serpentine is metamorphosed ultrabasic rock. Detailed descriptions of the deposits are included, as are analyses.

PECORA, WILLIAM THOMAS.

1. Esper Signius Larsen, Jr. (1879-1961): Geol. Soc. America Bull., v. 73, no. 4, p. P27-P29, port., **1962**.
2. Memorial of Esper Signius Larsen, 3d [1912-1961]: Am. Mineralogist, v. 47, nos. 3-4, p. 460-463, port., **1962**.

PENN, JOHN, 1760-1834.

1. John Penn's journal of a visit to Reading, Harrisburg, Carlisle, and Lancaster, in 1788: Pennsylvania Mag. History and Biography, v. 3, p. 284-295, **1879**. Casual geological observations are made along the route—mostly about the soils and rocks.

PENNSYLVANIA GEOLOGICAL SURVEY.

1. [Map showing] Distribution of Pennsylvania coals: Pennsylvania Geol. Survey, 4th ser. [Map 11], scale, 1 inch to 25 miles, [n.d.].
2. Oil and gas fields map of Pennsylvania: Pennsylvania Geol. Survey, 4th ser. [Map 10], scale, 1 inch to 25 miles, [n.d.].
3. [Map of] Physiographic provinces of Pennsylvania: Pennsylvania Geol. Survey, 4th ser. [Map 13], no scale, 8½ x 11 inches, [n.d.].
4. Geologic map of Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Map 7, scale, 1 inch to 25 miles [**1962**].
5. Map of the Mercer Clay and adjacent units in Clearfield, Centre, and

- Clinton Counties, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Map 12, scale, 1 inch to 1½ miles, **1964**.
6. A new fossil locality for Erie County: [Pennsylvania Dept.] Internal Affairs, v. 33, no. 5, p. 31-32, illus., **1965**. Two species of *Cyrtospirifer* are reported from an abandoned quarry in Erie County. The rock is the Amity Shale of Devonian age.
 7. Peat industry in Pennsylvania: [Pennsylvania Dept.] Internal Affairs, v. 33, no. 5, p. 27-29, illus., **1965**. This is a popular account of the occurrence of peat in the state. It is largely restricted to the northeastern and northwestern portions of the state, associated with the glacial deposits.
 8. [Map of] Limestone and dolomite distribution in Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Map 15, scale, 1 inch to 20 miles, text, **[1969]**.
 9. [Map of] Availability of water in Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Map 20, no scale, 9 x 12 inches, [n.d.].

PERLMUTTER, NATHANIEL MATTHEW, *see* Olmsted, Franklin Howard, 1.

PETERSEN, GARY WALTER.

1. (and Cunningham, Robert Lester, and Matelski, Roy P.). Moisture characteristics of Pennsylvania soils—[Part] 1, Moisture retention as related to texture: Soil Sci. Soc. America Proc., v. 32, no. 2, p. 271-275, illus., **1968**. Prediction equations for estimating available moisture from pre-determined soil properties are given for each textural class with the exception of sand and sandy clay. Soils from 27 counties are examined.
2. (and Cunningham, Robert Lester, and Matelski, Roy P.). Moisture characteristics of Pennsylvania soils—[Part] 2, Soil factors affecting moisture retention within a textural class—silt loam: Soil Sci. Soc. America Proc., v. 32, no. 6, p. 866-870, illus., **1968**. Soils from 27 countries were examined. Moisture retention decreases as coarse fragments increase, and remains constant regardless of organic content.

PETERSON, EDWARD C.

1. Titanium resources of the United States: U. S. Bur. Mines Inf. Circ. 8290, 65 p., illus., **1966**. Rutile from Chester County and titaniferous magnetite from Bucks County are known, but currently, none is of commercial interest.

PETERSON, NELS PAUL, *see* Kinkel, Arthur Rudolph, Jr., 1.

PETHERICK, THOMAS.

1. Reports by Thomas Petherick, esq., on the coal properties owned by the Pequa Railroad and Improvement Company, and the Dauphin and Susquehanna Coal Company: New York, H. Cogewell and Company, 10 p., **1849** [not seen].

PETTIJOHN, FRANCIS JOHN.

1. Some contributions of sedimentology to tectonic analysis: Internatl. Geol. Cong. 21st, Proc. Sec. 18, p. 446-454, illus., **1960**. Sedimentary features showing bedding plane rotation, such as cross-bedding and graded bedding are reviewed, as are features which show internal deformation, such as deformed oolites and *Skolithos* tubes, and cross-bed inclinations. An example of the detection of crustal shortening by the telescoping of pebble sizes is given from the Pottsville Formation from Pennsylvania.

PETTITT, JOHN M.

1. (and Beck, Charles Beverley). Seed from the Upper Devonian [McKean County]: Science, v. 156, no. 3783, p. 1727-1729, illus., **1967**. A possible seed from the Pocono Sandstone, considered Devonian, is described and illustrated. It was associated with *Archaeopteris* which was considered Devonian by Arnold (1935).
2. (and Beck, Charles Beverley). *Archaeosperma arnoldii*—a cupulate seed from the Upper Devonian of [McKean County] North America: Michigan Univ. Mus. Paleontology Contrib., v. 22, no. 10, p. 139-154, illus., **1968**. A seed of *Archaeosperma arnoldii* from the Oswayo Formation in McKean County is described and illustrated. This provides evidence for the presence of gymnosperms in the Mississippian.

PETTY, A. J., *see* Henderson, John Richard, Sr., 2; Popenoe, Peter, 1.

PHILBRICK, SHAILER SHAW.

1. Cyclic sediments and engineering geology: Internatl. Geol. Cong. 21st, Proc. Sec. 20, p. 49-63, illus., **1960**. The problems associated with cyclic sediments, best shown in the Appalachian Plateau, are described in connection with the construction of dams and other structures.

PHILLIPS, JOHN DANIEL.

1. Paleomagnetic results from the Devonian Catskill redbeds of Pennsylvania and their tectonic significance [abs.]: Am. Geophys. Union Trans., v. 47, no. 1, p. 80, **1966**.
2. A paleomagnetic study of the Devonian Catskill Formation of central Pennsylvania: PhD Thesis, Princeton Univ., **1966**; [abs.], Dissert. Abs., v. 28, no. 1, p. 235B, **1967**.

PHYFER, DANIEL W., *see* Carpenter, John Richard, 1.

PIERCE, CLYDE I., *see* Duda, J. R., 1; Komar, C. A., 1; Slagle, Franklyn D., 1.

PIERCE, KENNETH LEE.

1. Bedrock and surficial geology of the McConnellsburg Quadrangle [Franklin and Fulton Counties], southern Pennsylvania: PhD Thesis, Yale Univ., **1964**; Pennsylvania Geol. Survey, 4th ser. Atlas 109a [Bull. A 109a], 111 p., illus. incl. geol. map, **1966**. A complete geologic description of the area is given. Cambrian-Silurian rocks are mapped; folds and faults are the major structures. Considerable emphasis is placed on geomorphic

- development. Stone is the major mineral resource, and iron and pyrite are also present. Soil is considered an important mineral resource.
2. Geomorphic significance of a Cretaceous deposit in the Great Valley of [Franklin County] southern Pennsylvania, in Geological Survey research 1965: U. S. Geol. Survey Prof. Paper 525 C, p. C152-C156, illus., **1965**. Cretaceous lignitic material rests upon over 170 feet of carbonate-rock residuum. After accumulation, probably in a sinkhole, the deposit may have been lowered hundreds of feet by the solution of the underlying carbonates, and is consistent with regional rates of erosion.
 3. (and Armstrong, Richard Lee). Tuscarora Fault, and Acadian(?) bedding-plane fault in central Appalachian Valley and Ridge Province [Franklin and Fulton Counties]: Am. Assoc. Petroleum Geologists Bull., v. 50, no. 2, p. 385-390, illus., **1966**. A mylonite zone at the contact of the Reedsville and Salona Formations, both Ordovician, is exposed in several mountains; K-Ar dating of the mylonite suggests the fault is Acadian in age.

PIERCE, WILLIAM GAMEWELL.

1. (and Rich, Ernest Isaac). Summary of rock salt deposits in the United States as possible storage sites for radioactive waste materials: U. S. Geol. Survey Bull. 1148, 91 p., illus., **1962**. The Silurian Salina Formation is as much as 9,000 feet deep in northwestern Pennsylvania. There may be as many as 8 salt beds in north central Pennsylvania and one or two in southwestern Pennsylvania. Beds range from 5 to 200 feet thick.

PINSON, WILLIAM HAMET, JR., *see* Hart, Stanley Robert, 1.

PIPER, DUANE J., *see* Macfarlane, Robert M., 1.

PITTILLO, D. R., *see* Boynton, George R., 1-10.

PITTSBURGH GEOLOGICAL SOCIETY.

1. (and Appalachian Geological Society). Tectonics and Cambrian-Ordovician stratigraphy in the central Appalachians of Pennsylvania—Field Conf. September, 1963, Guidebook: Pittsburgh, Pittsburgh Geol. Soc., 129 p., illus., **1963**. Road logs for three days of field trips are included. One, from Bedford County, to State College, Centre County, is 141 miles long and makes six stops. The second, from State College to Hagerstown, Maryland, is 172 miles in Pennsylvania and makes 8 stops. The third, from Hagerstown to Bedford, includes 45 miles in Pennsylvania and has no formal stops. Very detailed descriptions of the stops and areas between the stops are included.

PLATT, LUCIAN B., *see also* Carswell, Louis Duncan, 3.

1. (and Carswell, Louis Duncan). Stratigraphy and structure of the [Ordovician] Martinsburg Formation near Harrisburg [southeastern] Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 76, p. 131, **1964**.
2. Taconic events in the Hamburg 15' Quadrangle [Berks, Lehigh, and Schuylkill Counties], Pennsylvania [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 1, p. 48-49, **1969**.

POJETA, JOHN, JR.

1. North America Ambonychiidae (Pelecypoda): *Palaeontographica Americana*, v. 5, no. 36, p. 131-241, illus., **1966**. The following are described and illustrated: *Byssopteria radiata* from the Chemung Formation of Tioga County, and numerous species of *Mytilarca* from the Chemung Formation of northern Pennsylvania.
2. Additional data on the Paleozoic pelecypod family Ambonychiidae: *Jour. Paleontology*, v. 42, no. 5, p. 1255-1257, illus., **1968**. *Byssopteria radiata* Hall from the Devonian Chemung Formation in Tioga County is described and illustrated.

POPENOE, PETER.

1. (and Petty, A. J., and Tyson, Natalie Smith). Aeromagnetic map of western Pennsylvania and parts of eastern Ohio, northern West Virginia, and western Maryland: U. S. Geol. Survey Geophys. Invs. Map GP 445, scale, 1:250,000, **1964**.

POPOVICH, DANIEL EUGENE.

1. Distribution of certain elements in the major rock units at the Cornwall [Lebanon County] and Morgantown [Berks County] mines, Pennsylvania: MS Thesis, Pennsylvania State Univ., **1965**.

POTH, CHARLES WARNER.

1. The occurrence of brine in western Pennsylvania: *Pennsylvania Geol. Survey*, 4th ser. Bull. M 47, 53 p., illus., **1962**. Fifty-one samples of brine from 14 formations are analyzed. The major components are Cl, Na, Ca, and Mg. Various minor and trace elements are also present. The origin is from the alteration of connate water.
2. Geology and hydrology of the Mercer Quadrangle, Mercer, Lawrence, and Butler Counties, Pennsylvania: *Pennsylvania Geol. Survey*, 4th ser. Bull. W 16, 149 p., illus. incl. geol. map, **1963**. Mississippian-Pennsylvanian, and Pleistocene rocks are mapped. The water-bearing properties of each are discussed. The glacial till is very thick in the valleys and is a good aquifer. Many analyses are included. Bedrock and surficial-material maps are included.
3. The ground-water observation-well program in Pennsylvania: *Pennsylvania Geol. Survey*, 4th ser. Bull. W 20, 18 p., illus., **1963**. Forty-seven wells throughout the state are used to keep records of the ground-water-level fluctuations. All are checked periodically for yield and water quality.
4. Geohydrology of the Mercer Quadrangle [Lawrence, Mercer, and Butler Counties] in northwestern Pennsylvania: PhD Thesis, Pennsylvania State Univ., **1964**; [abs.], *Dissert. Abs.*, v. 25, no. 4, p. 2450, **1964**.
5. Hydrology of the metamorphic and igneous rocks of central Chester County, Pennsylvania: *Pennsylvania Geol. Survey*, 4th ser. Bull. W 25, 84 p., illus. incl. geol. maps, **1968**. A small amount of adjoining Lancaster and Delaware Counties is included. The rocks are gabbro, gneiss, the Glenarm Series, and Cambro-Ordovician sedimentary rocks. Small bodies

of pegmatite and serpentine are also present. The water-bearing properties of each are discussed. Analyses are included.

6. Progress report on the hydrology of the [Ordovician] Martinsburg Formation in Lehigh and Northampton Counties, Pennsylvania: U. S. Geol. Survey Repts. Open File, 64 p., illus., 1969 [not seen].

POTTER, NOEL, JR.

1. (and Moss, John Hall). Origin of the Blue Rocks rock field and adjacent deposits, Berks County, Pennsylvania: Geol. Soc. America Bull., v. 79, no. 2, p. 255-262, illus., 1968. Large and small blocks of Silurian Tuscarora Quartzite have moved downward on a slope of Ordovician Martinsburg Shale during solifluction or creep stage in the periglacial climate of the Wisconsin glacial stage. The fine material in the interstices was removed later by running water.

POTTER, PAUL EDWIN.

1. (and Scheidigger, Adrian Eugen). Bed thickness and grain size—graded beds: Sedimentology, v. 7, no. 3, p. 233-240, illus., 1966. Examples of graded bedding from the Ordovician Martinsburg Formation in southeastern Pennsylvania, and others from elsewhere, are used to demonstrate the correlation between bed thickness and grain size.

POTZGER, JOHN ERNEST, 1886-1955.

1. The fossil record near the glacial border, in The glacial border—climatic, soil, and biotic features: Ohio Jour. Sci., v. 51, no. 3, p. 105-133, illus., 1951. The presence of more northern species of plants as fossils in areas just south of the glacial border suggest that the organisms' zones were shifted south when the niche had expanded.

POUGH, FREDERICK HARVEY.

1. . . . Garnets, part 8 of Rare faceting minerals: Lapidary Jour., v. 19, no. 4, p. 470-473, illus., 1965. Garnets from near Avondale, Chester County, are cited with others from elsewhere as good examples of silicate minerals for lapidary work.

PRATHER, BRUCE A., *see* Fergusson, William Blake, 1, 2.

PRATT, WALLACE EVERETTE.

1. Arville Irving Levorsen [1894-1965]: Am. Assoc. Petroleum Geologists Bull., v. 50, no. 1, p. 183-185, 1966.
2. Memorial to Arville Irving Levorsen (1894-1965): Geol. Soc. America Bull., v. 77, no. 4, p. P61-P66, port., 1966.

PROUTY, CHILTON EATON.

1. [Guidebook for] Third day, carbonate rocks in eastern Pennsylvania, in Lower Paleozoic carbonate rocks in Maryland and Pennsylvania: Johns Hopkins Univ. Studies Geology, no. 18, p. 61-101, illus., 1960. This is a road log for a field trip from Harrisburg to Carlisle, to Steelton, Pennsylvania. Forty-four miles are traversed, and four stops are made. Extremely detailed sections of Ordovician limestone exposures are included for each stop.

PUCKETT, DANNY W.

1. Caves in the Broadtop Mountain area [Huntingdon County]: Nittany Grotto News, v. 8, no. 5, p. 97-99, illus., **1960**; Speleo Digest 1960, p. I29-I31, illus., **1962**.

QUIRIN, BARBARA A., *see* Vlissides, Sophie Drakoulis, 1.

RABBITT, MARY COLLINS.

1. John Wesley Powell [1834-1902]—his life and times: GeoTimes, v. 14, no. 5, p. 10-12, illus., **1969**.

RALPH, ELIZABETH K.

1. (and Stuckenrath, Robert, Jr.). University of Pennsylvania radiocarbon dates, [Part] 5: Radiocarbon, v. 4, p. 144-159, **1962**. Wood from *Taxodium distichum*, the "Philadelphia Subway Tree", of Philadelphia County, is older than 42,000 years and is Sangamon in age, geologically.

RAND, LENOX HAWES, *see* Kerr, James R., 3.

RANKIN, DOUGLAS WHITING.

1. (and Stern, Thomas Whital, and Reed, John Calvin, Jr., and Newell, Marcia F.). Zircon ages of felsic volcanic rocks in the upper Precambrian of the Blue Ridge [Adams County], Appalachian Mountains: Science, v. 166, no. 3906, p. 741-744, illus., **1969**. Zircon from the Catoctin Formation in Adams County and from elsewhere yield discordant U-Pb ages, suggesting an original age of 820 my. An episodic loss of Pb at 240 my is taken as the time of the Blue Ridge thrust.

RANKIN, W. E.

1. Reconnaissance gravity surveying for drift-filled valleys in the Mercer Quadrangle [Mercer County], Pennsylvania: MS Thesis, Pennsylvania State Univ., **1969**.

RANNEY, RICHARD WILLARD.

1. An organic carbon-organic matter conversion equation for [northern] Pennsylvania: Soil Sci. Soc. America Proc., v. 33, no. 5, p. 809-811, illus., **1969**. A technique is described, using many samples from Pennsylvania, whereby organic carbon in soil can be measured as organic matter.

RANSOM, JAY ELLIS.

1. The rock-hunter's range guide—How and where to find minerals and gem stones in the United States: New York, Harper and Bros., 213 p., illus., **1962**. A general description of the principles of rock and fossil collecting is followed by very brief descriptions of locations for collecting material in various states, including Pennsylvania.

RAPP, ANDERS.

1. Pleistocene activity and Holocene stability of hillslopes, with examples from Scandinavia and [Centre County] Pennsylvania, in *L'évolution des versants—Symposium Internationale Géomorphologie*, 1966: Liege, Univ. Cong. et Colloques, v. 40, p. 229-244, illus., 1967; Uppsala Univ. Geog. Inst. Medd. ser. A, no. 220, 1967. Boulder stripes sorted polygons, block fields, solifluction beds and stabilized talus slopes are described as examples of periglacial features in an area now forested and stabilized.

RASETTI, FRANCO RAMO DIMO.

1. Middle Cambrian trilobites of the Pleasant Hill Formation in [Blair and Huntingdon Counties] central Pennsylvania: *Jour. Paleontology*, v. 39, no. 5, p. 1007-1014, illus., 1965. Eleven species are described and illustrated. *Blairella* is a new genus, and eight of the species are new.
2. Lower Cambrian agnostid trilobites of North America: *Jour. Paleontology*, v. 41, no. 1, p. 198-196, illus., 1967. *Eoagnostus roddyi* from the Kinzers Formation in Lancaster County is described and illustrated.

RAUCH, HENRY.

1. Cave-controlling geologic parameters within the Nittany Valley area of central Pennsylvania [abs.]: *Natl. Speleol. Soc. Bull.*, v. 31, no. 2, p. 40, 1969.
2. Control of cavern development by stratigraphic dip within the Nittany Valley area of central Pennsylvania [abs.]: *Natl. Speleol. Soc. Bull.*, v. 31, no. 2, p. 41-42, 1969.

RAY, CLAYTON EDWARD, *see also* Hibbard, Claude William, 1.

1. The identity of *Bison appalachicolus*: *Acad. Nat. Sci. Philadelphia Notulae Naturae* 384, 7 p., illus., 1966. The specimen from Bucks County is more likely *Bootherium sargenti* rather than a bison or a musk ox as has been suggested by others.

RAY, SATYABRATA.

1. (and Gault, Hugh Richard). Mineralogy of Jacksonburg (Middle Ordovician) Formation in [south] eastern Pennsylvania and western New Jersey: *Am. Assoc. Petroleum Geologists Bull.*, v. 45, no. 1, p. 39-50, illus., 1961. The mineralogy is monotonously uniform. Calcite is predominant; there is a small amount of dolomite. Mica, quartz, and chlorite are also present.

READ, CHARLES BRIAN.

1. (and Mamay, Sergius Harry). Upper Paleozoic floral zones of the United States, in *Geological Survey research 1960*: U. S. Geol. Survey Prof. Paper 400-B, p. B381-B383, illus., 1960. Three Mississippian and nine Pennsylvanian floral zones are tabulated from the Commonwealth. Their relationships to formations are included.

2. (and Mamay, Sergius Harry). Upper Paleozoic floral zones and floral provinces of the United States: U. S. Geol. Survey Prof. Paper 454-K, p. K1-K35, illus., **1964**. Fifteen floral zones occur, of which three are Mississippian, 9 are Pennsylvanian, and 3 are Permian. The flora of each zone is listed, as are the formations in which they occur. The chief floral component is listed, and all are part of the Appalachian floral province.

REED, JOHN CALVIN, JR., *see* Rankin, Douglas Whiting, 1.

REICHE, JAY R., JR., *see also* Mayers, Donald E., 1.

1. [Map of] Mount Joy Caves no. 2, 3, and 4 [Lancaster County]: York Grotto Newsletter, v. 2, no. 11, p. 164, **1961**.
2. [Map of] Reston Cave, Lancaster County: York Grotto Newsletter, v. 4, no. 6, p. 80-81, **1963**.

REIDENOUER, DAVID R.

1. Relationship between paleotopography and sulfur and coal: MS Thesis, Pennsylvania State Univ., **1966**.
2. (and Williams, Eugene Griffin, and Dutcher, Russell Richardson). The relationship between paleotopography and sulfur distribution in some coals of western Pennsylvania: Econ. Geology, v. 62, no. 5, p. 632-647, illus., **1967**. Coals from flat deposition areas exhibit little lateral variation in sulfur. Coals from paleotopographic low areas are variable horizontally and vertically in ash content and in sulfur content.
3. (and Williams, Eugene Griffin, and Dutcher, Russell Richardson). Relationship between paleotopography and the distribution of pyritic sulfur in some coals of western Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 115, p. 287-288, **1968**.
4. A petrographic approach to some highway problems [abs.]: Pennsylvania Acad. Sci. Proc. 1968, v. 42, p. 13, **1969**.

REIF, CHARLES BRADDOCK.

1. Temperature profiles and heat flow in sediments of Nuangola [Lake, Luzerne County]: Pennsylvania Acad. Sci. Proc., v. 43, p. 98-100, illus., **1969**. Thermal measurements across the bog mat and two in the lake, 30 and 60 m from the mat, reveal nearly isothermal conditions at 7 m below the bog surface, and at 5 m in the lake bottom sediments. Considering relationships to air temperatures, heat moves into bog sediments from lake water and into lake sediments as well as from the bog surface.

REITZ, ELLIOTT.

1. Worthless Cave (Clarion County, Pennsylvania): Speleo Digest 1959, p. 168-169, illus., **1961**.

REPUBLIC EXPLORATION COMPANY.

1. [Map of] Major geologic features of the United States and Cuba: [n.p.], Republic Exploration Company, scale, 1 inch to about 73 miles, [**1964?**].

RETCOFSKY, H. L.

1. (and Stark, J. M., and Friedel, Robert Augustine). Electron spin resonance in American coals: *Anal. Chemistry*, v. 40, no. 11, p. 1699-1704, illus., **1968**. Details of the unpaired electrons in coals with relation to rank are determined by ESR. Coals from various places in Pennsylvania are included with many others from elsewhere.
2. (and Friedel, Robert Augustine). Room-temperature proton magnetic relaxation times in a bituminous coal [southwestern Pennsylvania]: *Fuel*, v. 47, no. 5, p. 391-395, illus., **1968**. The vitrain-rich Pittsburgh coal was used to show that relaxation times are shorter than those of typical non-metallic solids, and are thought to be due to the promotion of relaxation processes by the paramagnetic species in the coal.
3. (and Friedel, Robert Augustine). Spectral studies of a carbon disulphide extract of bituminous coal [southwestern Pennsylvania]: *Fuel*, v. 47, no. 6, p. 487-498, illus., **1968**. The structure of the carbon disulfide extract from the vitrain-rich Pittsburgh coal was studied by various spectral techniques. Results are in graphs.

REVETTA, FRANK A.

1. (and Diment, William Horace). A regional gravity survey of New York and eastern Pennsylvania [abs.]: *Geol. Soc. America Abstracts with Programs* 1969, pt. 7, p. 187, **1969**.

REYNOLDS, JOHN HAMILTON, *see* Zartman, Robert E., 1.

REZNECK, SAMUEL.

1. Amos Easton [1776-1842]—A pioneer teacher of science in early America: *Jour. Geol. Education*, v. 13, no. 5, p. 131-134, **1965**.

RHOADS, SAMUEL NICHOLSON.

1. Notes on living and extinct species of North American Bovidae: *Acad. Nat. Sci. Philadelphia Proc.* 1897 [v. 49], p. 483-512, illus., **1898**. The name of the Pleistocene *Bison appalachicolus* from Durham Cave in Bucks County is changed to *Ovibos (Bootherium?) appalachicolus*.
2. The mammals of Pennsylvania and New Jersey: Philadelphia, privately printed, 266 p., **1903** [not seen].

RICH, ERNEST ISAAC, *see* Pierce, William Gamewell, 1.

RICHARDS, HORACE GARDINER.

1. The dating of the "Subway tree" of Philadelphia [Philadelphia County]: *Pennsylvania Acad. Sci. Proc.*, v. 34, p. 107-108, **1960**. Carbon-14 dating of the tree stump found 38 feet below the surface, and 10 feet below sea level, show it to be 36,000-42,000 years old, hence Pleistocene.
2. Catalogue of invertebrate types in the Academy of Natural Sciences in Philadelphia [abs.]: *Geol. Soc. America Spec Paper* 68, p. 252, **1962**.

3. (and Shapiro, Earl). A Devonian faunule from Lehighon [Lehigh County], Pennsylvania: *Pennsylvania Acad. Sci. Proc.*, v. 37, p. 206-207, illus., **1963**. An exposure of the Ludlowville Formation with an unusually large number of pelecypods of Middle Devonian age is described. *Pthonia pennsylvanica* is new and is described and illustrated. Other invertebrates are also listed.
4. (and Judson, S. Sheldon, Jr.). The Atlantic Coastal Plain and the Appalachian Highlands in the Quaternary, in *The Quaternary of the United States*: Princeton, New Jersey, Princeton Univ. Press, p. 129-136, illus., **1965**. A summary of the occurrence of periglacial phenomena is given. Boulder fields, block streams, soil deformation, loess, and ice-eroded geomorphic features are included.
5. (and others). INQUA field conference B-1, central Atlantic Coastal Plain—INQUA Congress, 7th: Lincoln, Nebraska Acad. Science, p. 1-28, illus., **1965**. Stops at Morrisville, Bucks County, to examine Wisconsin-aged gravels in the Delaware River drainage which have been infused with gravels from other drainage basins to the north. Locally-derived Cretaceous material has also been mixed.
6. Philadelphia's fossils—dinosaurs in your backyard: *Frontiers*, v. 31, no. 2, p. 36-41, illus., **1966**. This is a popular account of the occurrence of dinosaurs and other large animals. Those from Triassic rocks in southeastern Pennsylvania are of especial interest.

RICHTER, DENNIS, *see* Avery, Gene, 1.

RICKABY, HAROLD COLMAN.

1. Memorial to Cyril Workman Knight, 1879-1960: *Geol. Assoc. Canada Proc.*, v. 13, p. 137, port., [**1962**].

RICKARD, LAWRENCE VROMAN.

1. Stratigraphy of the Upper Silurian Salina Group, New York, Pennsylvania, Ohio, Ontario: *New York State Mus. and Sci. Service Map and Chart Ser.*, no. 12, 57 p., illus., **1969**. Much detailed information about the Salina Group in the subsurface of northern and northwestern Pennsylvania is included. Lithologic and radioactivity logs are correlated, and isopach and lithofacies maps for several of the units are also included. Various salt basins are clearly shown.

RICKETTS, EDWIN BURNLEY, *see* Nicholls, Percy, 1.

RIEDEL, WALTER LEONARD, *see* Habib, Daniel, 2.

RIGGS, ELLIOTT ARTHUR.

1. [Map of] Major basins and structural features of United States: *Maplewood, New Jersey, Geographic Press*, scale, 1 inch to 75 miles, **1960**. The Martine Thrust, Gettysburg, Newark, and Dunkard Basins, and the Nittany, Chestnut Ridge, and Laurel Hill Anticlines are included.

RIMA, DONALD ROBERT, *see also* Greenman, David Wolcott, 1.

1. Pennsylvania, in Water levels and artesian pressures in observation wells in the United States 1955, Part 1, northeastern states: U. S. Geol. Survey Water-Supply Paper 1404, p. 246-277, illus., **1957**. Tabulated data from many counties in the state include information about the level below the surface that the water table rests from time to time during the year.
2. (and Meisler, Harold, and Longwill, Stanley Miller). Geology and hydrology of the Stockton Formation in southeastern Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. W 14, 111 p., illus. incl. geol. map, **1962**. The formation is composed of interbedded arkoses, arkosic conglomerate, feldspathic sandstone, red shale, and siltstone. The distribution and water-bearing properties of each are discussed. The origin of local variations in water yield are described, and many analyses are included.

RISTOW, WALTER W.

1. Erwin Raisz, 1893-1968: Special Libraries Assoc. Geography and Map Div. Bull. 75, p. 9-10, **1969**.

RITTER, DALE FRANKLIN, *see* Judson, S. Sheldon, Jr., 3.

ROBBINS, CAROLINE.

1. An active and intelligent antiquary, Governor Thomas Pownall [1722-1805]: Pennsylvania History, v. 26, no. 1, p. 1-20, port., **1959**.

ROBERTS, CARL HAROLD.

1. Oriskany found in [Clearfield County] Pennsylvania syncline: Oil and Gas Jour., v. 58, no. 16, p. 174, 178, illus., **1960**. A thick section of Devonian Oriskany Sandstone has been found between two anticlines upon which the Oriskany is absent or thin.

ROBERTS, FRANCIS H.

1. Retrograde metamorphism of ultramafic rocks along the Precambrian axis of southeastern Pennsylvania [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 1, p. 51, **1969**.

ROBERTS, WILLIAM F.

1. (and Dickeson, Montroeville Wilson). Reports on property belonging to the American Chrome Company of New York, in Maryland and [southeastern] Pennsylvania: New York, Dodge and Gratton, 18 p., **1864** [not seen]

ROBINSON, ALFRED E., *see* Seaber, Paul Robert, 6.

ROBINSON, GEORGE CALVER.

1. Geology of the southern half of the Millerstown [Juniata and Perry Counties] Pennsylvania 15 minute topographic quadrangle: MS Thesis, Univ. West Virginia, **1958**.

ROCKWOOD, CHARLES GREENE, JR., 1843-1913.

1. Notices of recent earthquakes—no. 4: Am. Jour. Sci., 3d ser. v. 7, p. 384-387, **1874**. An earthquake is reported from near Sharon, Mercer County, on August 17, 1873. No details are included.

RODGERS, JOHN.

1. Mechanics of Appalachian foreland folding in Pennsylvania and West Virginia: Am. Assoc. Petroleum Geologists Bull., v. 47, no. 8, p. 1527-1536, illus., **1963**. The foreland folds in southwestern Pennsylvania are the result of slipping of the upper strata of a part of the plateau north-westward over their substrata, which was less deformed. The pressure comes from the Valley and Ridge folding forces.
2. Basement and no-basement hypotheses in the Jura and Appalachian Valley and Ridge, in *Tectonics of the southern Appalachians*: Virginia Polytech. Inst., Geol. Dept. Mem. 1, p. 71-80, illus., **1964**. Examples are taken from Paleozoic rocks and structures of Pennsylvania to show that the basement structures are too small and disoriented to have participated in, or influenced, Paleozoic decollement folding. It remained passive during the late Paleozoic Appalachian folding.
3. Chronology of tectonic movements in the Appalachian region of eastern North America, in *Symposium on the chronology of tectonic movements in the United States*: Am. Jour. Sci., v. 265, no. 5, p. 408-427, illus., **1967**. A summary includes discussions of: Precambrian movement in the Glenarm Series of southeastern Pennsylvania, Late Ordovician Taconic movements, Devonian activity (the Acadian Orogeny) post Lower-Permian folding (the Appalachian Orogeny *par excellence*), and of Late Triassic faulting.
4. The eastern edge of the North American continent during the Cambrian and Early Ordovician, in *Studies of Appalachian geology—northern and maritime*: New York, Interscience Publishers, p. 141-149, illus., **1968**. The abrupt facies change between the dark-colored, pyritic Conestoga Limestone to the south and carbonate-bank-type limestones to the north, well exposed in Lancaster County, is interpreted as a possible edge-of-the-continent depositional change at that time. An abrupt declivity could cause the change.
5. Some problems of the tectonics of the Appalachians: *Geotectonics* 1968, no. 3, p. 145-157, illus., **1968**; translated from Russian. A general survey of the tectonics of the Appalachians includes those in Pennsylvania. The folds and faults in the Valley and Ridge, and Plateau Provinces do not include the basement. The Piedmont and Blue Ridge are composed of metamorphosed Paleozoic rocks, and are the locations of the soles of the overthrusts.

ROEN, JOHN B., *see also* Kent, Bion Huntley, 1, 7.

1. (and Kent, Bion Huntley, and Schweinfurth, Stanley Paul). Geologic map [and sections] of the Monongahela Quadrangle [Allegheny, Washington, and Westmoreland Counties] southwestern Pennsylvania: U. S. Geol. Survey Geol. Quad. Maps of the U. S., Map GQ 743, scale, 1:24,000, text, **1968**. Pennsylvanian, Permian, and Quaternary rocks are

mapped. Structure contours on the base of the Pittsburgh Coal show gentle undulations in the rocks. Coal, gas, and stone are the major mineral resources.

2. A transcurrent structure in Fayette and Green Counties, Pennsylvania, *in* Geological Survey research 1968: U. S. Geol. Survey Prof. Paper 600C, p. C149-C152, illus., **1968**. Peridotite intruded along a pre-existing strike-slip left lateral fault. This fault intersects numerous structures more conformable to the Appalachian trends. The lineament is considered to be the reflection of differential movement along the margin of a sub-surface decollement.
3. (and Hosterman, John Wallace). Analyses and potential uses of selected shales and clays, Greene County, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 67, 29 p., illus., **1969**. Seven clays from four different Pennsylvanian and Permian formations were examined. They cannot be used in filler or high-grade refractory industries, but all but one could be used for bricks. One is suitable for lightweight aggregate.

ROGERS, CLEAVES LINCOLN.

1. (and Jaster, Marion Charlotte). [Map of] Titanium in the United States, exclusive of Alaska and Hawaii: U. S. Geol. Survey Mineral Invs. Resource Map MR 29, scale, 1:3,168,000, separate text, **1962**. Three titanium deposits are shown in Chester County and vicinity. It occurs as titaniferous magnetite and as rutile.

ROGERS, DOUGLAS, JR., *see* Fettke, Charles Reinhard, 14.

ROGERS, MARION ALAN, *see also* Swain, Frederick Morrill, Jr., 5.

1. Organic geochemistry of some Devonian black shales from eastern North America—carbohydrates: PhD Thesis, Univ. Minnesota, **1965**; [abs.], Dissert. Abs. B, v. 27, no. 4, p. B1192-B1193, **1966**.

ROMER, ALFRED SHERWOOD.

1. A large ophiacodont pelycosaur from the Pennsylvanian of the Pittsburgh [Allegheny County] region: *Breviora*, no. 144, 7 p., illus., **1961**. *Clepsydrops magnus* from the Conemaugh Formation is described and illustrated.
2. [Edward Drinker] Cope [1840-1897] vs. [Othniel Charles] Marsh [1831-1889], *in* Famous zoologists: Systematic Zoology, v. 13, no. 4, p. 201-207, ports., **1964**.

ROMISCHER, W. M., *see* Ash, Simon Harry, 1, 4.

RONES, MORRIS, 1922-1965.

1. Recognition and interpretation of some carbonate rock types in the Ordovician of central Pennsylvania, *in* Lower Paleozoic carbonate rocks in Maryland and Pennsylvania: Johns Hopkins Univ. Studies Geology, no. 18, p. 28-41, illus., **1960**. Lower and Middle Ordovician carbonate rocks

in central Pennsylvania are discussed prior to a field trip. Petrographic descriptions and environmental interpretations are included. Vertical and lateral relationships are discussed.

2. (and Donaldson, Alan Chase). [Guidebook for] Second day, central Pennsylvania, *in* Lower Paleozoic carbonate rocks in Maryland and Pennsylvania: Johns Hopkins Univ. Studies Geology, no. 18, p. 49-62, illus., **1960**. A road log for a field trip of 116 miles with 6 stops is given. Each stop is extensively discussed; all are in Ordovician limestones. The trip begins in State College, Centre County, and ends at Harrisburg, Dauphin County, but is primarily in the Centre County area.
3. A lithostratigraphic, petrographic, and chemical investigation of the lower Middle Ordovician carbonate rocks in central Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. G 53, 224 p., illus., **1969**. Detailed chemical and microscopic analyses of four formations are made, and comparisons between the units are given. The various facies are analyzed in terms of relationships to shorelines and tectonic environment, and their cyclic nature is explained.

RONEY, GRADY.

1. (and Hoch, John Hampton). Adam Seybert (1773-1825): Am. Jour. Pharmacy, v. 127, p. 346-358, **1955**.

ROOT, SAMUEL I., *see also* MacLachlan, David B., 2.

1. Cyclicity of the Conococheague Formation [Franklin County]: Pennsylvania Acad. Sci. Proc., v. 38, no. 2, p. 157-160, illus., **1965**. Each cycle is initiated by intraformational conglomerates—oolites-stromatolites which pass upward through interlaminated limestone-dolomite, into pure limestone. Equivalents to the east and west also show cyclicity indicating uniform basin tectonics and sedimentation during Late Cambrian time.
2. Geology and mineral resources of southeastern Franklin County, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Atlas 119cd [Bull. A 119cd], 118 p., illus. incl. geol. map, **1968**. A complete geologic description of the area is given. Precambrian-Ordovician, and Cenozoic (and Cretaceous?) materials are mapped. Folds are the major structures. Stone, and sand and gravel are the chief mineral resources.
3. Structure and termination of the Blue Ridge Mountains [southeastern] Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 121, p. 254-255, **1969**.

ROSE, ARTHUR W.

1. Origin of local and temporal heavy metal variations in stream sediments [?southeastern Pennsylvania] [abs.]: Mining Engineering, v. 20, no. 12, p. 47, **1968**.

ROSE, HARRY JOSEPH, JR., *see* Stern, Thomas Whital, 2.

ROSS, HOWARD PERSING.

1. Detailed electrical surveys in the Triassic Basin, north Chester County, Pennsylvania: MS Thesis, Pennsylvania State Univ., **1963**.

ROTH, ERNEST E.

1. Natural gases of Appalachian Basin, in *Natural gases of North America*, v. 2: Tulsa, Oklahoma, Am. Assoc. Petroleum Geologists, p. 1702-1715, illus., **1968**. A general review of the occurrence of natural gas in Pennsylvania is included. The gases are of good quality and occur in Paleozoic rocks of all ages. No specific details are included, however.

ROTH, WILLIAM C.

1. Pennsylvania, in *Ground-water levels in the United States 1958-1962—northeastern states*: U. S. Geol. Survey Water-Supply Paper 1782, p. 201-243, illus., **1965**. Levels of the ground-water table below the surface are given for many counties in the state. A small amount of information about the water-bearing rocks is also included.

ROUGH, ROBERT L., *see also* Overbey, William K., Jr., 3.

1. (and Eckard, William E.) Results of hydraulic fracturing in shallow oil sands, Warren County, Pa.: *Producers Monthly*, v. 27, no. 8, p. 9-15, illus., **1963**. Petrographic descriptions of the Glade and Clarendon sands of Devonian age, from wells near Sugar Grove, are included in an otherwise engineering report.

ROUSE, JOHN THOMAS.

1. (and Behre, Charles Henry, Jr.). Memorial to Walter Herman Bucher (1888-1965): *Geol. Soc. America Bull.*, v. 77, no. 6, p. P99-P107, port., **1966**.

ROWE, JACK JAMES, *see* Gottfried, David J. J., 2.

ROWELL, ALBERT JOHN.

1. The genera of the brachiopod superfamilies Obolaceae and Siphonotretaceae: *Jour. Paleontology*, v. 36, no. 1, p. 136-152, illus., **1962**. *Yorkia wanneri* Walcott from Cambrian sandstone near Emigsville and York, York County, is redescribed and reclassified.

ROWLAND, GERALD LEE.

1. Frederick Charles Leonard, 1896-1960: *Metcoritics*, v. 2, no. 1, p. vi-vii, port., **1963**.

ROY, JEAN L.

1. L'application du palaeomagnetisme aux tectoniques des Appalaches—resultats des couches rouges de [Silurian] Bloomsburg [central Pennsylvania] [abs.]: *Royal Soc. Canada Trans.*, ser. 4, v. 4, sec. 3, App., p. 15, **1966**.
2. (and Opdyke, Neil D., and Irving, Edward). Further paleomagnetic results from the Bloomsburg Formation: *Jour. Geophys. Research*, v. 72, no. 20, p. 5075-5086, illus., **1967**; discussion by K. M. Creer, v. 74, no. 12, p. 3299-3302, illus., **1969**; reply by authors, p. 3303. Many of the samples are from central Pennsylvania. Those poles determined paleomagnetically from around the arc of the Appalachians to the northeast,

are similar. Permian heating of the southern exposures (in Maryland and West Virginia) preclude rigorous testing.

RUDISILL, HAROLD, *see also* Miller, Charles, 8.

1. Colnorum Cave [York County]: York Grotto Newsletter, v. 4, no. 10, p. 134-135, illus., **1963**.

RUKAVINA, NORMAN ANDREW.

1. Grain orientation *vs* texture and internal structure in [Ordovician] Martinsburg [Formation] turbidites near Hamburg [Berks County] Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 101, p. 185, **1968**.

RUNCORN, SAMUEL KEITH, *see* Collinson, D. W., 1.

RUSSELL, WILLIAM E.

1. Holter Pit Cave, Centre County: Nittany Grotto News, v. 10, no. 1, p. 7, illus., **1961**; Speleo Digest 1961, p. 147, illus., **1963**.
2. Seven Springs Farm Cave, Huntingdon County: Nittany Grotto News, v. 10, no. 2, p. 27, illus., **1961**.
3. Tiny Cave (Centre County, Pennsylvania): Nittany Grotto News, v. 10, no. 3, p. 40, illus., **1961**; Speleo Digest 1961, p. 148, illus., **1963**.
4. Coonscat Cave [Centre County]: Nittany Grotto News, v. 10, no. 9, p. 173-174, illus., **1962**.
5. Hol-Bruck Cave, Centre County: Nittany Grotto News, v. 10, no. 5, p. 80-81, illus., **1962**.
6. Suicide Hole Cave, Centre County: Nittany Grotto News, v. 10, no. 7, p. 123, illus., **1962**.
7. (and Davis, Nevin W.). The lost caves of central Pennsylvania: Nittany Grotto News, v. 11, no. 4, p. 58-60, illus.; no. 5, p. 85-87, illus.; no. 7, p. 138, illus.; no. 9, p. 178-179, illus., **1963**. Brief description and sketch maps of several caves not commonly visited are given.

RYAN, JOHN DONALD, *see also* Myers, Paul Benton, Jr., 1.

1. Structural problems in the area of the field trip, in Structure and stratigraphy of the Reading Hills and Lehigh Valley in Northampton and Lehigh Counties, Pennsylvania—Field Conf. Pennsylvania Geologists, 26th: Bethlehem, Pennsylvania, Lehigh Univ., p. 25-36, **1961**. A generalized description of the structures of the region is given as part of the information preceding a field trip. Special emphasis is placed upon the contact relations between the crystalline rocks of the Reading Hills and the younger sedimentary rocks adjacent to them, and the nature of the folds and related structures in the rocks of the Lehigh Valley. The overthrust *vs* anticlinal origin of the Hills is reviewed, and a newer, Taconic-aged structure is suggested.
2. Structure and stratigraphy of the Reading Hills and Lehigh Valley in Northampton and Lehigh Counties, Pennsylvania—Field Conf. Pennsylvania Geologists, 26th: Bethlehem, Pennsylvania, Lehigh Univ., 78 p., illus., **1961**. Several papers by different authors dealing with different aspects of the geology of the region are followed by road logs for a two-

day field trip. The first day begins and ends in Bethlehem, is 57 miles long, and makes 7 stops; the second day begins in Bethlehem and ends at the Delaware Water Gap, is 66 miles long, and makes 6 stops. Each stop is described in detail.

3. Cross-bedding formed by lateral accretion in the Catskill Formation near Jim Thorpe [Carbon County] Penna.: Pennsylvania Acad. Sci. Proc., v. 38, no. 2, p. 154-156, **1965**. Cross-beds, whose dip azimuths are perpendicular to the sedimentary transport direction, are believed to have formed as point bars by a process of lateral accretion.

SALVER, HENRY A.

1. A stratigraphic and petrologic study of the Mississippian Loyalhanna Limestone of western Pennsylvania: MS Thesis, Univ. Pittsburgh, **1962**.

SAMPSON, EDWARD.

1. I. May chromite crystallize late? Econ. Geology, v. 24, no. 6, p. 632-641, illus., **1929**. The chromite deposits in the Wood Mine, Lancaster County, are cited as an example of vein, or replacement chromite rather than a magmatic segregation.
2. Varieties of chromite deposits: Econ. Geology, v. 26, no. 8, p. 833-839, illus., **1931**. The chromite deposit in Wood's Mine, in Lancaster County, is cited as an example of hydrothermally-emplaced ore. Active replacement by chromite in veins in serpentinite is noted.

SANDELL, ERNEST BIRGER, *see* Hara, T., 1.

SANDERS, JOHN ESSINGTON.

1. Relationships of folds to faults in Upper Triassic rocks, northeast of the Schuylkill [River, southeastern] (Pennsylvania to Massachusetts) [abs.]: Geol. Soc. America Spec. Paper 68, p. 261, **1962**.
2. Late Triassic tectonic history of northeastern United States: Am. Jour. Sci., v. 261, no. 6, p. 501-524, illus., **1963**. The Triassic rocks were deposited in a rift valley 50-70 miles wide. Four episodes of tectonism are recognized: (1) initial graben formation, deposition, and igneous activity; (2) longitudinal arching in the graben and the erosion of the arches; (3) second generation graben subsidence; and (4) faulting and development of folds and igneous activity along the faults.

SANDO, WILLIAM JASPER.

1. Lower Ordovician section near Chambersburg [Franklin County] Pennsylvania: Geol. Soc. America Bull., v. 69, no. 7, p. 837-854, illus., **1958**. The Beekmantown Group is at least 3,500 feet thick. The Rockdale Run Formation overlies the Stonehenge Limestone. Sections are described; fossils are listed and illustrated..

SANFORD, JOHN THERON.

1. John Reed Moseley (1900-1959): Am. Assoc. Petroleum Geologists Bull., v. 44, no. 9, p. 1583-1584, port., **1960**.
2. Memorial to John Reed Moseley (1900-1959): Geol. Soc. America Proc. 1960, p. 137-138, port., **1962**.

SASS, DANIEL B.

1. Some aspects of the paleontology, stratigraphy, and sedimentation of the Corry Sandstone of northwestern Pennsylvania: PhD Thesis, Univ. Cincinnati, **1959**; *Bulls. Am. Paleontology*, v. 41, no. 192, p. 251-381, illus. incl. geol. map, **1960**. Sponges and brachiopods from the Lower Mississippian formation are described and illustrated. The formation has three members, and may correlate with the upper portion of the Bedford Shale of Ohio.
2. Septate syringothyrids from the Corry Sandstone (Lower Mississippian) of northwestern Pennsylvania [abs.]: *Geol. Soc. America Spec. Paper* 68, p. 261-262, **1962**.

SAUNDERS, R. S.

1. (and Smith, Norman Dwight). Environmental control of acritarchs in the Silurian of eastern Pennsylvania [abs.]: *Geol. Soc. America Abstracts with Programs* 1969, pt. 1, p. 53, **1969**.

SAVAGE, DONALD ELVIN, *see* Hibbard, Claude William, 1.

SAY, THOMAS, 1787-1834.

1. Observations on some species of zoophytes, shells, etc., principally fossil: *Am. Jour. Sci.*, v. 1, p. 381-387, **1819**; v. 2, p. 34-45, **1820**. *Favosites striata*, a coral of uncertain age, but probably Devonian, is described and reported from "Pittsburgh and Wilkes-Barre, Pennsylvania". A pentremite is reported "dug up in a garden in the Borough of Reading, [Lebanon County] Pennsylvania".

SAYLOR, TIMOTHY E.

1. The Precambrian in the subsurface of northwestern Pennsylvania and adjoining areas: *Pennsylvania Geol. Survey*, 4th ser. Inf. Circ. 62, 25 p., illus., **1968**. Petrographic descriptions of Precambrian rocks from 3 wells, one each in Erie, Crawford, and Mercer Counties, are given. Both igneous and metamorphic rocks are present.

SCHAPIRO, NORMAN, *see* Gray, Ralph Joseph, 1.

SCHEIDIGGER, ADRIAN EUGEN, *see* Potter, Paul Edwin, 1.

SCHEMEL, MART PHILLIP, *see* Cross, Aureal Theophilus, 1.

SCHINER, GEORGE R., *see* Kimmel, Grant E., 1, 2.

SCHLEICHER, DONALD P.

1. Completed map report [Blue Hole Cave, Blair County]: *Netherworld News*, v. 17, no. 4, p. 194-197, illus., **1969**.

SCHLOSSMAN, S.

1. (and Gibbons, John R.). Relation of the ringing effect and stress relaxation in ringing diabase boulders [southeastern Pennsylvania] [abs.]: Pennsylvania Acad. Sci. Proc., v. 43, p. 13-14, **1969**.

SCHMIDT, VICTOR A., *see also* Dunn, John Robert, 1.

1. (and Dunn, John Robert). Lemon Hole Cave. Westmoreland County: Netherworld News, v. 9, no. 12, p. 213-214, illus., **1961**.
2. Bear Cave (Westmoreland County, Pennsylvania): Speleo Digest 1960, p. I44-I50, illus., **1962**.

SCHMITT, LARRY, *see also* Cormany, Robert, 1.

1. Baker Cave no. 2 (Franklin County, Pennsylvania): Worlds Below, v. 1, no. 6, p. 11, illus., **1961**; Speleo Digest 1961, p. I6-I7, illus., **1963**.
2. Blue Spring Caves (Franklin County, Pennsylvania): Worlds Below, v. 1, no. 6, p. 12, illus., **1961**; Speleo Digest 1961, p. I8, illus., **1963**.
3. Cedar Cave (Franklin County, Pennsylvania): Worlds Below, v. 1, no. 6, p. 7, illus., **1961**; Speleo Digest 1961, p. I5, illus., **1963**.
4. Woodstock Cave (Franklin County, Pennsylvania): Worlds Below, v. 1, no. 6, p. 9, illus., **1961**; Speleo Digest 1961, p. I5-I6, illus., **1963**.

SCHNEIDER, WILLIAM JOSEPH, *see also* Barksdale, Henry Compton, 2; Stuart, Wilbur Tennant, 3.

1. Areal variability of low flows in a basin of diverse geologic units: Water Resources Research, v. 1, no. 4, p. 509-515, illus., **1965**. Large-scale areal in low-flow characteristics of stream-flow are caused primarily by differences in the geology in the 576-square-mile Swatara Creek Basin, eastern Pennsylvania. The lowest flow is in shale-basins and the highest is in sandstone areas.
2. Pennsylvania, *in* Water data for metropolitan areas: U. S. Geol. Survey Water-Supply Paper 1871, p. 292-310, **1968**. Sources of water, which include ground water, for twelve large areas in Pennsylvania are given. Analyses are included.

SCHOEPEF, JOHANN DAVID, 1752-1800.

1. Travels through Berks County in 1783: Pennsylvania Mag. History and Biography, v. 5, p. 74-81, **1881**. Topographic and geologic descriptions of the county are included in this extract from his German edition of travels in the United States.

SCHOFIELD, ALLAN.

1. (and Haskin, Larry). Rare-earth distribution patterns in eight terrestrial materials [western Pennsylvania]: Geochim. et Cosmochim. Acta, v. 28, no. 4, p. 437-446, illus., **1964**. A bituminous coal from western Pennsylvania is included. Of the 15 rare earths sought, Ce is the most abundant (12.2 ± 1.0 ppm) and Lu was not detected.

SCHRAMM, MARTIN WILLIAM, JR.

1. Oil and gas possibilities of the northern Appalachian Basin: *Producers Monthly*, v. 25, no. 4, p. 22-25, illus., **1961**. A summary of the geology of the region includes cursory descriptions of the Middle Devonian to Cambro-Ordovician rocks and the general structure of the Appalachian Basin. There is much potential for oil and gas production.

SCHUBERTH, CHRISTOPHER JOHN.

1. Geology of the Port Jervis South Quadrangle, New York, New Jersey, [Pike County] Pennsylvania: MS Thesis, New York Univ., **1960**.

SCHWAB, FREDERICK L.

1. Petrology, paleocurrents, and depositional environments of [Cambrian] Antietam Formation in the central Appalachians [southeastern Pennsylvania] [abs.]: *Geol. Soc. America Abstracts with Programs* 1969, pt. 7, p. 201-202, **1969**.

SCHWEINFURTH, STANLEY PAUL, *see also* Berryhill, Henry Lee, Jr., 3; Kent, Bion Huntley, 1, 7; Roen, John B., 1.

1. Geologic map [and sections] of California Quadrangle, Washington and Fayette Counties, Pennsylvania: U. S. Geol. Survey Quad. Maps of the U. S., Map GQ 648, scale, 1:24,000, text, **1967**. Only Pennsylvanian, Permian, and Quaternary rocks are mapped. Structure contours on the base of the Pittsburgh Coal are included also. Coal, gas, and stone are the main mineral resources present.

SCOTT, ROBERT CLYDE.

1. (and Barker, Franklin Britt). Data on uranium and radium in ground water in the United States, 1954 to 1957: U. S. Geol. Survey Prof. Paper 426, 115 p., illus., **1962**. Eleven of over 500 samples come from Pennsylvania; the data are in tables. Seventeen different elements and radicals are sought, and none of the samples contains any significant amounts of uranium.

SEABER, PAUL ROBERT, *see also* Page, Leland, Vernon, 1.

1. (and Hollyday, Este F.). An appraisal of the ground-water resources of the lower Susquehanna River Basin [central and southeastern Pennsylvania]—an interim report: U. S. Geol. Survey Repts. Open File, 123 p., illus., **1965** [not seen].
2. (and Hollyday, Este F.). Hardness of ground water in the glacial deposits of the Susquehanna River Basin, New York and north-central Pennsylvania [abs.]: *Geol. Soc. America Spec. Paper* 82, p. 181, **1965**.
3. (and Hollyday, Este F.). An appraisal of the ground-water resources of the Juniata River Basin, [central] Pennsylvania: U. S. Geol. Survey Repts. Open File, 125 p., illus., **1966** [not seen].
4. An appraisal of the ground-water resources of the upper Susquehanna River Basin in [northern and central] Pennsylvania: U. S. Geol. Survey Repts. Open File, 130 p., illus., **1968** [not seen].

5. (and Hollyday, Este F.). Statistical analysis of [Susquehanna River Basin] regional aquifers [abs.]: Geol. Soc. America Spec. Paper 101, p. 196-197, **1968**.
6. (and Robinson, Alfred E.). Conjunctive use of ground and surface water in the eastern urban areas [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 1, p. 55, **1969**.

SEAMAN, DAVID MARTIN.

1. Recent fossil collecting in western Pennsylvania: Rocks and Minerals, v. 35, nos. 5-6, p. 214-216, **1960**. This is a popular account of invertebrate-fossil collecting sites in western Pennsylvania. Several road cuts and quarries (Mississippian and Pennsylvanian) and their fossil contents (mostly brachiopods) are described.

SEIFERT, WILBUR H.

1. (and Lytle, William Stuckley). Oil and gas developments in the Youngs-ville-Sugar Grove field of Warren County, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 162, 13 p., illus., **1963**. Oil and gas occur in the Devonian Glade Sand, and details of their occurrence are given.

SELVIG, WALTER ALFRED, *see also* Gibson, Francis Harold, 1; Nicholls, P., 1.

1. (and Gibson, Francis Harold). Analyses of ash from United States coals: U. S. Bur. Mines Bull. 567, 33 p., illus., **1956**. Ash from many different coals, both anthracite and bituminous, from many parts of the Commonwealth, is analyzed for 10 different oxides; proximate and ultimate analyses are also included.

SEVON, WILLIAM DAVID, 3d.

1. The Bowmanstown boulder field, Carbon County, Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 40, no. 2, p. 90-94, illus., **1967**. The field is three-fourths of a mile long. The boulders, one to two feet in diameter were transported into the valley from outcrops immediately to the north by rock-glacier creep, probably in Pleistocene time.
2. Fossiliferous lithosomes in the Mahantango Formation, Carbon and Monroe Counties, Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 41, p. 161-165, illus., **1967**. Three mappable, fossiliferous limestones in the formation are described. The lower two thicken to the northeast and pinch out to the southwest, and the upper one, at the top of the formation, is laterally more persistent. The middle one is the Centerfield Zone and the upper one is the Tully Limestone.
3. Erratic cobbles in alluvial gravels of the Lehigh River, Carbon County, Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 43, p. 180-182, illus., **1969**. Precambrian cobbles in Lehigh River gravels, 22 miles downstream from the Wisconsin moraine, give clues to the rates of erosion and transportation of the river since the Wisconsin.
4. Field trip no. 1C. Sedimentology of some Mississippian and Pleistocene deposits of northeastern Pennsylvania, *in* Geology of selected areas in New Jersey and eastern Pennsylvania: New Brunswick, New Jersey, Rutgers Univ. Press, p. 214-234, illus., **1969**. Sedimentologic features

- in the Devonian-Mississippian Catskill-Pocono transition zone and in eleven Pleistocene boulder fields in Carbon County are visited on a one-day field trip one hundred miles long and which makes 4 stops.
5. Lateral continuity of the Ridgeley, Scholarie-Esopus and Palmerton Formations in Carbon and Schuylkill Counties, Pennsylvania: Pennsylvania Acad. Sci. Proc. 1968, v. 42, p. 190-192, illus., **1969**. Detailed mapping shows the thinning and disappearance of the Ridgeley Formation southwest of Andreas. The persistent sandstone which is present has lateral continuity with the Palmerton Formation.
 6. The Pocono Formation in northeastern Pennsylvania—Field Conf. Pennsylvania Geologists, 34th: Harrisburg, Pennsylvania Bur. Topog. and Geol. Survey, 129 p., illus., **1969**. A detailed description of the Mississippian Pocono Formation is given. The type section is at Jim Thorpe, on the Lehigh River, and can be divided into four distinct lithologic units. Detailed measured sections are included. A field trip of two days visits specific locations to examine each of the components, whose relationships are discussed. The trip begins and ends in Hazleton and is 240 miles long; it includes nine stops. Brief geological descriptions *en route* are included.
 7. Subaqueous mudflow origin of basal Pocono rocks in northeastern Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 121, p. 373-374, **1969**.

SEYBERT, ADAM, 1773-1825, *see* Woodhouse, James, 2.

SHACKLETTE, HANSFORD THRELKELD, *see* Cannon, Helen Leighton, 1.

SHADLE, H. W.

1. (and Griffiths, John Cedric). An attempt to establish oil reservoir favorability criteria based on quantitative petrographic analysis, *in* Nineteenth technical conference on petroleum production: Pennsylvania State Univ. Mineral Industries Exper. Sta. Bull., v. 68, p. 61-66, **1955**. Using a discriminant function designed to differentiate oil-bearing from barren Mississippian rocks, samples from a number of outcrops of Pocono Sandstone were petrographically examined. A wide trend from east to west across Pennsylvania is evident in the discrimination index coinciding with growing favorability toward the west as would be expected.
2. The petrography of the [Mississippian] Pocono Formation—an application of discriminant function and multiple regression techniques: MS Thesis, Pennsylvania State Univ., **1957**.

SHAFFNER, MARCHANT NISSLEY.

1. Geology and mineral resources of the Donegal Quadrangle [Fayette, Somerset, and Westmoreland Counties] Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Atlas 48 [Bull. A 48], 116 p., illus. incl. geol. map, **1963**. A complete geologic description of the area is given. Mississippian-Permian rocks are mapped. Gentle folds comprise the structures. Coal is the major mineral resource and natural gas, clay and stone are also present. A small amount of iron ore is reported, and ground water is abundant. Analyses of the coals are included.

SHANK, JOHN CHARLES, *see also* Crowe, Christopher, 1.

1. A detailed magnetic survey in the Triassic Basin, north Chester County: MS Thesis, Pennsylvania State Univ., **1961**.

SHAPIRO, EARL, *see* Richards, Horace Gardiner, 3.

SHEFFEY, NOLA BEWLEY *see* Stadnichenko, Taisia Maximova, 1; Zubovic, Peter, 1, 2.

SHELTON, F. H.

1. Springs and spas of old-time Philadelphia [southeastern Pennsylvania]: Pennsylvania Mag. History and Biography, v. 47, p. 196-237, **1923**. This is an historical account of the use of spring water in colonial and early Philadelphians. Many locations of springs are included.

SHEPPARD, RICHARD A.

1. (and Hunter, Ralph Eugene). Chamosite oolites in the Devonian of [Dauphin County] Pennsylvania: Jour. Sed. Petrology, v. 30, no. 4, p. 585-588, illus., **1960**. Small chamosite oolites from the Montebello Sandstone in Dauphin County are described. The environment was marine, slightly reducing, having a small clastic influx, and with currents strong enough to agitate sand grains.

SHEPPS, VINCENT CHESTER, 1928-1967, *see also* Tomikel, John C., 2.

1. (and others). Glacial geology of northwestern Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. G 32, 59 p., illus. incl. geol. map, **1959**. A study of the character, distribution, and history of the glacial deposits is given. Analyses of tills are included as textural graphs. The deposits are of Illinoian and Wisconsinan age. Sand and gravel, clay, and ground water are discussed as economic products.
2. Pennsylvania and the ice age: Pennsylvania Geol. Survey, 4th ser. Educ. Ser. no. 6, 33 p., illus., **1962**. This is a popular account of the effects of the Pleistocene ice advances in the state, preceded by a general description of the causes and effects of glaciation.
3. (editor). Symposium on Middle and Upper Devonian stratigraphy of Pennsylvania and adjacent states: Pennsylvania Geol. Survey, 4th ser. Bull. G 39, 301 p., illus., **1963**. This symposium contains 20 papers, each of which is cited separately by author.

SHERIDAN, EUGENE THOMAS, JR., *see* deCarlo, Joseph Anthony, 1.

SHERRILL, RICHARD ELLIS, 1899-1952.

1. Possible future oil pools of Pennsylvania: Producers Monthly, v. 9, no. 7, p. 16-23, illus., **1944**. A resume is given of the various oil sands in Pennsylvania and includes an outline of those which could be oil-producers. No geologic data are included, however.

SHERWOOD, WILLIAM CULLEN.

1. Structure of the Jacksonburg Formation in the Lehigh Valley, *in* Structure and stratigraphy of the Reading Hills and Lehigh Valley in Northampton

and Lehigh Counties, Pennsylvania—Field Conf. Pennsylvania Geologists, 26th: Bethlehem, Pennsylvania, Lehigh Univ., p. 40-43, illus., **1961**. Over 1,000 feet of limestone and argillaceous limestone, with a chert-conglomerate at the base, are described. Recumbent isoclinal folds are dominant, and upon these are large open folds and small crinkle folds of a second generation which have been superimposed homoaxially. Thrust and normal faults, joints, and lineations are also present and described.

2. Structure of the Jacksonburg Formation in Northampton and Lehigh Counties, Pennsylvania: PhD Thesis, Lehigh Univ., **1961**; [abs.], Dissert. Abs., v. 22, No. 10, p. 3610-3611, **1962**; Pennsylvania Geol. Survey, 4th ser. Bull. C 45, 64 p., illus. incl. geol. map, **1964**. Over 1,000 feet of limestone and argillaceous limestone are present, with a chert-conglomerate at the base. Two distinct phases of deformation are recognized. Isoclinal, open folds, faults, and lineations are present and extensively discussed.

SHIELDS, RONALD R.

1. (and Sopper, William Edward). An application of surface geophysical techniques in the study of watershed hydrology [central Pennsylvania]: Water Resources Bull., v. 5, no. 3, p. 37-49, illus., **1969**. A shallow seismic refraction survey and an electrical resistivity study of the 106-acre Leading Ridge watershed were used to determine the depth of soils, volume of soils, depth to bedrock, bedrock surface configuration, and the water table. Such information makes watershed evaluation more accurate.

SHIRK, WILLIAM R.

1. (and McCall, Ronald M.). Geology and geography of South Mountain and environs [southeastern Pennsylvania]: Pennsylvania Council for Geography Education, 14th Ann. Conf., 54 p., illus. [**1967**]. A general summary of the geomorphology, structure, and historical and economic geology is followed by a review of the geography of the area and a description of field trip stops along the road from Biglerville to Chambersburg, Shippensburg, Boiling Springs and back to Shippensburg.

SHITE, B.

1. (and Shite, W., and Hagenbuch, M. Jay, and Hagenbuch, Keith). Seilheimer Cave (Huntingdon County, Pennsylvania): Speleo Digest 1961, p. I51-I52, illus., **1963**.

SHITE, W., *see* Shite, B., 1.

SHREWSBURY, RAYMOND D., *see* Moore, Billy J., 1, 2, 3, 4.

SHRIDE, ANDREW FLETCHER, *see* Chidester, Alfred Herman, 1.

SHROCK, ALTA E.

1. A preliminary analysis of an unglaciated bog in [Somerset County] Pennsylvania: Univ. Pittsburgh Bull., v. 41, p. 246-249, illus., **1945**. Glade

Bog was cored to 15.5 feet and the pollen spectra reviewed. Various pollen maxima variations are attributed to glacial advances.

SHROCK, ROBERT RAKES.

1. Memorial to Irving Ballard Crosby (1891-1959): Geol. Soc. America Proc. 1959, p. 117-120, port., **1960**.
2. Memorial to Hervey Woodburn Shimer (1872-1965): Geol. Soc. America Bull., v. 75, no. 5, p. P73-P79, port., **1966**.

SHUSTER, EVAN T.

1. (and White, William Blaine). Seasonal variations in spring water chemistry as a means for analyzing carbonate aquifers [abs.]: EOS, v. 50, no. 4, p. 141, **1969**.

SIDDIQUI, SHAMS H.

1. Hydrogeologic factors influencing well yields and aquifer hydraulic properties of folded and faulted carbonate rocks in central Pennsylvania: PhD Thesis, Pennsylvania State Univ., **1969**; (and Parizek, Richard Rudolph). [abs.]: EOS, v. 50, no. 4, p. 154, **1969**.

SIEGRIST, HENRY GALT, JR.

1. Petrology of graphite-bearing rocks of Chester County, Pennsylvania: MS Thesis, Pennsylvania State Univ., **1959**.
2. Multivariate statistical study of two sandstones: PhD Thesis, Pennsylvania State Univ., **1961**.

SIMMS, FREDERICK EUGENE.

1. Geology of the Morgantown North, West Virginia-[Fayette and Greene Counties] Pennsylvania, 7.5 minute topographic quadrangle: MS Thesis, West Virginia Univ., **1960**.

SIMON, JACK AARON, *see* Spackman, William, 1.

SIMPSON, DALE R.

1. Conditions of formation of prehnite and associated vein minerals in diabase near Coopersburg, [Bucks County] Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 37, p. 166-168, **1963**. Textural relations indicate that prehnite, alpha quartz, and calcite cocrystallized. Experimental studies show a cover of no more than 1000 m was present, and the temperature of formation could not have exceeded 375°C.
2. Hornfels associated with Triassic diabase [southeastern Pennsylvania] [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 1, p. 55-56, **1969**.
3. Nature and formation of prehnite veins in Triassic dikes [Bucks County] [abs.]: Geol. Soc. America Spec. Paper 121, p. 375-376, **1969**.
4. Prehnite veins in Triassic diabase, Coopersburg, [Bucks County] Pennsylvania: Geol. Soc. America Bull. v. 80, no. 7, p. 1355-1361, illus., **1969**. Inclusion-choked albite crystallized from a hydrothermal liquid, and

inclusion-free rims of the albite formed after a change of the liquid to a vapor. Later, amphibole, chlorite, and finally, predominantly prehnite were crystallized.

SIMPSON, THOMAS A., *see* Hopkins, William B., 1; Stuart, Wilbur Tennant, 1.

SIMS, SAMUEL JOHN.

1. The Grace Mine magnetite deposit, Berks County, Pennsylvania, *in* Ore deposits of the United States, 1933-1967, v. 1: New York, Am. Inst. Mining, Metallurgical, and Petroleum Engineers, p. 108-124, illus., **1968**. Magnetite, segregated from diabase magma, intruded and replaced Cambrian limestone. Pyrite and chalcopyrite are common accessories, and pyrrhotite occurs locally. Serpentine, talc, and chlorite are the major gangue minerals.
2. Millard Quarry, Annville [Lebanon and Dauphin Counties], Pennsylvania, *in* The geology of mineral deposits in south-central Pennsylvania—Field Conf. Pennsylvania Geologists, 33rd: Harrisburg, Pennsylvania Bur. Topog. and Geol. Survey, p. 52-63, illus., **1968**. Lime and metallurgical limestone from the high-calcium Annville Limestone of Ordovician age, is described. Petrographic, lithologic, and chemical details of the limestone are given. The limestone exposed in the quarry is on an overturned north limb of a complex anticlinorium; smaller structures are described also. The nature of the folding influences the exploration for more stone.

SIRKIN, LESLIE A.

1. Correlation of Late Glacial pollen stratigraphy and environments in the northeastern U. S. A.: *Rev. Palaeobotany and Palynology*, v. 2, nos. 1-4, p. 205-218, illus., **1967**. Pollen from southeastern Pennsylvania is included. The presence of tundra-like vegetation is recognized. The herb-pollen zone transgresses Late Glacial time and is generally succeeded by the spruce pollen zone as early as Late Kent time in the region of the terminal moraines.

SITLER, ROBERT FRANCIS.

1. Petrography of till from northeastern Ohio and northwestern Pennsylvania: *Jour. Sed. Petrology*, v. 33, no. 2, p. 365-379, illus., **1963**. Thin section and heavy mineral analyses of tills show variations in texture in different stratigraphic units and in different sedimentary facies. Quantitative data suggest successive reworking of older tills in younger tills.
2. Weathering in glacial till [northwestern Pennsylvania] [abs.]: *Geol. Soc. America Abstracts with Programs* 1969, pt. 6, p. 43, **1969**.

SKERLEC, GRANT M.

1. (and Wise, Donald Underkoffler). Anomalous tectonic breccias at Donegal Springs, Lancaster County, Pennsylvania: *Pennsylvania Acad. Sci. Proc.*, v. 41, p. 141-147, illus., **1967**. The masses are interpreted as products of dilatency in a hinge zone of the tilting Triassic basins, with the deformation localized along weakness zones of pre-existing nappes. Differing

accessibility of channelways to overlying Triassic materials during expansion (post-flow-folding in age) accounts for the wide variability in lithology.

SKIDMORE, WILFRED BRIAN, *see* Pavlides, Louis, 1.

SLAGLE, FRANKLIN D.

1. (and Pierce, Clyde I.). Densities and porosities of core samples from wells in Appalachian [western Pennsylvania] oil fields: U. S. Bur. Mines Inf. Circ. 8330, 75 p., illus., [1967]. Porosity and bulk- and sand-grain-density values were determined from eleven locations in western Pennsylvania. Devonian-Mississippian rocks are included.

SLOBODIAN, SCOTT.

1. (and Hixson, George). Bruckerhoff Cave extension [central Pennsylvania]: Nittany Grotto News, v. 8, no. 6, p. 113, illus., 1960.

SLOSS, LAURENCE LOUIS.

1. (and Dapples, Edward Charles, and Krumbein, William Christian). Lithofacies maps—An atlas of the United States and southern Canada: New York, John Wiley and Sons, 108 p., illus., 1960. Maps include Pennsylvania and show the isopachous and lithofacies distribution of rocks of all the periods and, in some cases, of the Epochs.

SMART, J. SAMUEL.

1. (and Surkan, Alvin John). The relation between mainstream length and area in drainage basins: Water Resources Research, v. 3, no. 4, p. 963-974, illus., 1967. Bailey Run, in Potter County, is cited as an example of a theoretical study to demonstrate that the variation in mainstream sinuosity appears to have a small but significant variation with area, and the general statement that drainage basins become more elongate as area increases is not necessarily so.

SMELTZER, BERNARD L., *see also* Haller, Robert, 1; Hivner, Barry, 1; Landis, Charles, 2; Turner, Thomas D., 1.

1. Allensville Cave . . . Mifflin County: Nittany Grotto News, v. 7, no. 3, p. 89-90, illus., 1959; Speleo Digest 1959, p. I32-I36, illus., 1961.
2. Caves near York, [York County] Pennsylvania, Part 1: Nittany Grotto News, v. 7, no. 10, p. 184-188, illus., 1959; Part 2, no. 11, p. 204-208, illus., 1969; Speleo Digest 1959, p. I37-I61, illus., 1961. Numerous caves are described and mapped.
3. Little Aitkin Cave, Mifflin County: Netherworld News, v. 7, no. 2, p. 43-45, illus., 1959; Speleo Digest 1959, p. I28, I30-I31, illus., 1961.
4. [Map of] Marble Cave, York County: York Grotto Newsletter, v. 1, no. 5, p. 41, 1959.
5. Carnegie Cave extension (Cumberland County, Pennsylvania): York Grotto Newsletter, v. 2, no. 4, p. 46, 1960; Speleo Digest 1960, p. 119-120, illus., 1962.

6. Herblengths Cave (Paintersville Cave), Mifflin County: Nittany Grotto News, v. 8, no. 5, p. 90-91, illus., **1960**; Speleo Digest 1960, p. I33-I34, illus., **1962**.
7. [Long's Cave, Perry County]: York Grotto Newsletter, v. 1, no. 9, p. 79-80, illus., **1960**; Speleo Digest 1960, p. I16-I17, illus., **1962**.
8. [Map of] Pigeon Cave, York County, Pa.: York Grotto Newsletter, v. 1, no. 6, p. [51], **1960**.
9. [Map of] Sandy Cave, York Co., Pa.: York Grotto Newsletter, v. 1, no. 6, p. [52], **1960**.
10. Stouts Bridge Cave, Berks County: Nittany Grotto News, v. 9, no. 2, p. 29-30, illus., **1960**; Speleo Digest 1960, p. I33-I35, illus., **1962**.
11. Big Spring Cave [Cumberland County]: York Grotto Newsletter, v. 2, no. 12, p. 177-178, 180, illus., **1961**; Speleo Digest 1961, p. I21-I22, illus., **1963**.
12. [Map of] Boiling Springs Caves 1 and 2, Cumberland County, Pa.: York Grotto Newsletter, v. 2, no. 10, p. 151, **1961**.
13. [Map of] Boiling Springs Caves 3 and 4, Cumberland Co., Pa.: York Grotto Newsletter, v. 2, no. 10, p. 152, **1961**.
14. [Map of] Centerville Cave, Cumberland Co., Pa.: York Grotto Newsletter, v. 2, no. 11, p. 166, **1961**.
15. [Map of] Cochlin Cave, Cumberland Co., Pa.: York Grotto Newsletter, v. 2, no. 11, p. 166, **1961**.
16. [Map of] Conodoguinet Cave, Cumberland Co., Pa.: York Grotto Newsletter, v. 2, no. 9, p. 136, **1961**; Speleo Digest 1961, p. I29, I31-I32, illus., **1963**.
17. Conodoguinet Rock House [Cave, Cumberland County]: York Grotto Newsletter, v. 2, no. 12, p. 178, 181, illus., **1961**; Speleo Digest 1961, p. I33, illus., **1963**.
18. [Map of] Freeburg Cave . . . Snyder County: Speleo Digest 1959, p. I72, **1961**.
19. Marl Cave (Cumberland County): York Grotto Newsletter, v. 2, no. 11, p. 165, **1961**; Speleo Digest 1961, p. I34, I36-I37, illus., **1963**.
20. Parker Cave [Cumberland County]: York Grotto Newsletter, v. 2, no. 8, p. 115-116; no. 11, p. 167, illus., **1961**, Speleo Digest 1961, p. I27-I28, illus., **1963**.
21. (and Stone, Ralph Walter) Shady Grove Cave (Franklin County, Pennsylvania): York Grotto Newsletter, v. 3, no. 5, p. 73, 75, illus., **1961**; Speleo Digest 1961, p. I10-I11, illus., **1963**.
22. Sharp Farm Cave (Cumberland County): York Grotto Newsletter, v. 2, no. 11, p. 168, **1961**; Speleo Digest 1961, p. I29-I30, illus., **1963**.
23. Skelly Cave [Cumberland County]: York Grotto Newsletter, v. 3, no. 4, p. 57-59, illus., **1961**; Speleo Digest, p. I18-I19, illus., **1963**.
24. Springside Farm Cave (Cumberland County, Pennsylvania): York Grotto Newsletter, v. 2, no. 6, p. 100, **1961**; Speleo Digest 1961, p. I21, I22, illus., **1963**.
25. Stoughstown Cave [Cumberland County]: York Grotto Newsletter, v. 2, no. 12, p. 179, 182, illus., **1961**; Speleo Digest 1961, p. I24, illus., **1963**.

26. Thrush Farm Cave, Cumberland County: York Grotto Newsletter, v. 2, no. 7, p. 105-106, 110, illus., **1961**; Speleo Digest 1961, p. 125-126, illus., **1963**.
27. Wonderland Cave no. 2, Bedford County: Netherworld News, v. 9, no. 2, p. 33-34, illus., **1961**; Speleo Digest 1961, p. 154, 157, illus., **1963**.
28. [Map of] Brownstone Cave . . . Dauphin County . . . : York Grotto Newsletter, v. 3, no. 12, p. [179], **1962**.
29. Buchanan Cave [Franklin County]: York Grotto Newsletter, v. 3, no. 10, p. 151, 153, illus., **1962**.
30. Gorman Caves [Franklin County]: York Grotto Newsletter, v. 4, no. 1, p. 10-11, 13-14, illus., **1962**.
31. Keefer Cave [Franklin County]: York Grotto Newsletter, v. 4, no. 4, p. 58-59, illus., **1962**.
32. Overcash Cave no. 5 (Hidden Lake Cave) [Franklin County]: York Grotto Newsletter, v. 3, no. 9, p. 133-135, 138-139, illus., **1962**.
33. [Map of] Wild Cat Cave . . . Dauphin County . . . : York Grotto Newsletter, v. 3, no. 12, p. [180], **1962**.
34. (and Stone, Ralph Walter). Woodchuck Cave [Franklin County]: York Grotto Newsletter, v. 3, no. 6, p. 86, 89, illus., **1962**.
35. Woodchuck Pit [Cave, Franklin County]: York Grotto Newsletter, v. 3, no. 10, p. 152, 154, illus., **1962**.
36. Zimmerman Cave [Franklin County]: York Grotto Newsletter, v. 3, no. 12, p. 177-178, illus., **1962**.
37. Further discoveries in Franklin Co., Pa. [Blue Springs Cave no. 1]: York Grotto Newsletter, v. 5, no. 6, p. 74-76, illus., **1964**; map, v. 5, no. 2, p. 21, **1963**; Speleo Digest 1963, p. 126-128, illus., **1965**.
38. Barrville Cave . . . Mifflin County: York Grotto Newsletter, v. 4, no. 12, p. 158-160, illus., **1963**.
39. Craighead Cave [York County]: Speleo Digest 1961, p. 134-135, illus., **1963**.
40. Deerdorff Cave . . . [central Pennsylvania]: Speleo Digest 1961, p. 114, illus., **1963**.
41. Devils Hole rock shelter . . . [York County]: York Grotto Newsletter, v. 5, no. 5, p. 62-63, illus., **1963**. The shelter is in a joint in the Marburg Schist, which is described in detail.
42. Hall Cave . . . Huntingdon County: York Grotto Newsletter, v. 5, no. 4, p. 47-50, illus., **1963**.
43. The helectites of Bahner's Cave [Northumberland County]: York Grotto Newsletter, v. 5, no. 3, p. 24-26, illus., **1963**. Most are white and translucent or transparent. They occur in groups along cracks, and many are spine-like, showing little curvature. All are monocrystalline. The origin is in caves with no appreciable air movement.
44. Highland Park Cave [Mifflin County]: York Grotto Newsletter, v. 4, no. 7, p. 95-96, illus., **1963**.
45. Johnson Caves . . . Mifflin County: York Grotto Newsletter, v. 5, no. 1, p. 8-12, illus., **1963**.
46. Monocrystalline speleothems found in Crystal Paradise Cave [Dauphin County]: York Grotto Newsletter, v. 4, no. 8, p. 106-109, illus., **1963**; Speleo Digest 1963, p. 1156-1160, illus., **1965**. Rare monocrystalline helectites are described and illustrated. The origin is unclear.

47. Moyer Caves [Dauphin County]: York Grotto Newsletter, v. 4, no. 10, p. 145-148, illus., **1963**.
48. Nales no. 2 [Cave, Mifflin County]: York Grotto Newsletter, v. 4, no. 8, p. 119-122, illus., **1963**.
49. Rail Rock House [Cave, York County]: York Grotto Newsletter, v. 4, no. 8, p. 120, 124, illus., **1963**.
50. [Map of] Woodward Cave no. 2, Centre County: Speleo Digest 1961, p. I49-I50, **1963**.
51. Caves of the southern Cumberland Valley [south-central Pennsylvania]: MAR Bull. 6, p. 5-126, illus., **1964**. Numerous caves in the Cambrian and Ordovician rocks of the Great Valley region are described and mapped.
52. Host Cave (Berks County, Pennsylvania): York Grotto Newsletter, v. 5, no. 8, p. 106-108, illus., **1964**; Speleo Digest 1964, p. I9-II1, illus., **1966**.
53. Kreider Cave . . . Lebanon County: York Grotto Newsletter, v. 5, no. 10, p. 127-129, illus., **1964**.
54. [Map of] Long Quarry Cave, Fulton County: York Grotto Newsletter, v. 5, no. 7, p. 87, illus., **1964**.
55. Potential cave regions in Fulton County, Pennsylvania: York Grotto Newsletter, v. 5, no. 7, p. 85-88, illus., **1964**; Speleo Digest 1964, p. I4-I7, illus., **1966**. Limestone areas in the county are outlined and considered potential cave areas yet only two caves are known—these are mapped.
56. St. Marks Cave [York County]: York Grotto Newsletter, v. 5, no. 11, p. 137-139, illus., **1964**.
57. Shaffer Run Cave . . . Bedford County: York Grotto Newsletter, v. 5, no. 9, p. 117-118, illus., **1964**.
58. [Map of] Hennigh Cave, Centre County: York Grotto Newsletter, v. 8, no. 3, p. 42-43, illus., **1966**.
59. Notes on four Northumberland County caves: York Grotto Newsletter, v. 10, no. 3, p. 32-35, illus., **1968-1969**.

SMITH, CHESTER MARTIN, JR.

1. Quantitative petrographic comparison of the [Devonian] Bradford Third and Lewis Run Sands [McKean County]: PhD Thesis, Pennsylvania State Univ., **1964**; [abs.], Dissert. Abs., v. 25, no. 8, p. 4740, **1965**.

SMITH, EDGAR FAHS, 1854-1928.

1. James Woodhouse [1770-1809], a pioneer in chemistry: Philadelphia, John C. Winston Company, 299 p., illus., **1918**.

SMITH, GEORGE G., JR.

1. Good Cave (Venango County, Pennsylvania): Spelco Digest 1959, p. 170, illus., **1961**.

SMITH, HAROLD THEODORE UHR.

1. Periglacial frost features and related phenomena in the United States: *Biuletyn Peryglacjalny*, ser. 3, no. 11, p. 325-342, **1962**. This is a review of the various types of periglacial features which are recognized from various places in the United States, including Pennsylvania. Included are boulder fields, block fields, rubble deposits, and boulder rings and stripes in northern and eastern Pennsylvania. Some are considered as type examples.

SMITH, NORMAN, DWIGHT, *see also* Saunders, R. S., 1.

1. Cyclic sedimentation in a Silurian intertidal sequence in eastern Pennsylvania: *Jour. Sed. Petrology*, v. 38, no. 4, p. 1301-1304, illus., **1968**. Cycles of an erosional surface overlain by a thin, coarse-grained deposit, a lower green sandstone-shale member, and an upper burrow-mottled red argillaceous siltstone in the Clinton Formation at Schuylkill Gap, Lehigh County, are attributed to intertidal deposition.
2. Lower and Middle Silurian fluvial sedimentation of the south-central Appalachians [abs.]: *Geol. Soc. America Spec. Paper* 115, p. 293-294, **1968**.
3. A stratigraphic and sedimentologic analysis of some Lower and Middle Silurian clastic rocks of the north-central Appalachians: PhD Thesis, Brown Univ., **1967**; [abs.], *Dissert. Abs. B*, v. 28, no. 8, p. B3345, **1968**.
4. Criteria for recognition of the braided stream environment, with examples from the Lower Silurian of the north-central Appalachians [abs.]: *Geol. Soc. America Spec. Paper* 121, p. 285, **1969**.
5. Cyclic deposits in a transitional facies of the Clinton Formation (Silurian) in [north]eastern Pennsylvania [abs.]: *Geol. Soc. America Spec. Paper* 121, p. 377, **1969**.
6. Downslope variations in stratification in the Tuscarora Quartzite (Silurian) of central Pennsylvania [abs.]: *Geol. Soc. America Abstracts with Programs* 1969, pt. 1, p. 56, **1969**.

SMITH, R. D.

1. Paleontology of the [Pennsylvanian] Columbiana Shale near Corsica [Jefferson County] Pennsylvania: MS Thesis, Pennsylvania State Univ., **1968**.

SMITH, RICHARD ELBRIDGE.

1. Petrographic properties influencing porosity and permeability in the carbonate-quartz system as represented by the Gatesburg Formation [Centre County]: PhD Thesis, Pennsylvania State Univ., **1966**; [abs.], *Dissert. Abs. B*, v. 27, no. 5, p. 1521B, **1966**; summary, *Producers Monthly*, v. 31, no. 6, p. 18-23, illus., **1967**.
2. Petrography-porosity relations in the carbonate quartz system, Gatesburg Formation (Late Cambrian), [central] Pennsylvania: *Am. Assoc. Petroleum Geologists Bull.*, v. 53, no. 2, p. 261-278, illus., **1969**. Cyclic deposits ranging from nearly pure dolomite to nearly pure quartzite are recognized. Principal components and multiple regression analyses are made; the cycles are interpreted as beach-lagoon-dune sedimentary system. Conclusions regarding porosity are made, including that intergranular porosity in this system is not related to grain size.

SMITH, RICHARD WELLINGTON.

1. Andrew Brown [1896-1963]: Mining Engineering, v. 16, no. 8, p. 85-86, **1964**.

SMITH, ROBERT.

1. Hershey's Cave [Cumberland County]: Guácháro, v. 2, no. 1, p. 14-15, illus., **1960**.

SMITH, THOMAS JEFFERSON, *see* James, David Evan, 3.

SMITH, WILLIAM HENKING.

1. (and O'Brien, Neal Ray). Middle and Late Pennsylvanian flint clays: Jour. Sed. Petrology, v. 35, no. 3, p. 610-618, illus., **1965**. Clay from Elizabeth, Allegheny County, and many others from elsewhere, was formed by the alteration of ordinary fine-grained Pennsylvanian sediments in acid swamps.

SMITHERINGALE, WILLIAM GEORGE.

1. Isotopic composition of sulfur in the Triassic igneous rocks of eastern United States: PhD Thesis, Massachusetts Inst. Tech., **1963**; [abs.], Geol. Soc. America Spec. Paper 73, p. 247-248, **1963**.
2. (and Jensen, Mead Leroy). Sulfur isotopic composition of the Triassic igneous rocks of eastern United States: Geochim. et Cosmochim. Acta, v. 27, no. 12, p. 1183-1207, illus., **1963**. Six samples come from various places in southeastern Pennsylvania. Quartz diabase and "anorthosite" were also included in the samples, as were various sulphide minerals from the Cornwall mine in Lebanon County. The application of the data to sulfur isotope fractionation is discussed.

SOCOLOW, ARTHUR ABRAHAM, *see also* Gray, Carlyle, 4; O'Neill, Bernard J., Jr., 2.

1. Geologic interpretation of aeromagnetic maps, Easton and Riegelsville Quadrangles [Bucks and Northampton Counties], Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 39, 6 p., illus., **1960**.
2. Geologic interpretation of aeromagnetic maps, Hatboro and Langhorne Quadrangles [Bucks, Montgomery, and Philadelphia Counties]: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 40, 7 p., illus., **1960**.
3. Geologic interpretation of aeromagnetic maps, Pottstown, Wagontown, Downingtown, Coatesville, Unionville, Honeybrook, and Parkesburg Quadrangles [Lancaster and Chester Counties]: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 37, 14 p., illus., **1960**.
4. Geologic interpretation of aeromagnetic maps, Temple, Flectwood, Manatawny, Reading, Birdboro, and Boyertown Quadrangles [Berks, Chester, and Montgomery Counties]: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 38, 26 p., illus., **1960**.
5. Geologic interpretation of certain aeromagnetic maps of Bucks, Montgomery, and Lehigh Counties: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 42, 6 p., illus., **1960**. cursory geological explorations for magnetite in the following quadrangles are made: Bedminster and Lumberville in Bucks County; Telford, Ambler, and Doylestown in Bucks and Mont-

gomery Counties; Lansdale in Montgomery County, and Collegeville in Montgomery and Chester Counties.

6. Structural interpretation from aeromagnetic maps [southeastern Pennsylvania] [abs.]: Geol. Soc. America Bull., v. 71, no. 12, pt. 2, p. 1982, **1960**.
7. Geologic interpretation of certain aeromagnetic maps of Lancaster, Berks, and Lebanon Counties: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 41, 19 p., illus., **1961**. Magnetic anomalies are interpreted in the following quadrangles: Lebanon and Richland in Lebanon and Lancaster Counties; Womelsdorf in Lancaster, Berks, and Lebanon Counties; Sinking Spring in Lancaster and Berks Counties; and Manheim, Lititz, Ephrata, Terre Hill, Columbia East, Lancaster, Leola, New Holland, and Gap in Lancaster County.
8. Geologic interpretation of the aeromagnetic maps of southern York County: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 46, 16 p., illus., **1961**. Included are interpretations of West York, York, Red Lion, Seven Valleys, and Glen Rock Quadrangles in York County, and the Abbottstown and Hanover Quadrangles in York and Adams Counties.
9. Geologic interpretation of the aeromagnetic map of Alburtis Quadrangle, Lehigh and Berks Counties: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 44, 5 p., illus., **1961**.
10. Geologic interpretation of the aeromagnetic maps of Hummelstown, Palmyra [Dauphin and Lebanon Counties] and Bernville [Bucks County] Quadrangles: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 45, 5 p., illus., **1961**.
11. Metasedimentary specularite deposit in the [Cambrian] Harpers Formation of [York County] Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 68, p. 184, **1962**.
12. In memoriam—Ralph W[alter] Stone [1876-1964]: State Geologists Jour., v. 17, no. 2, p. 32, **1965**.

SOHN, ISRAEL GREGORY.

1. Memorial to Wilbert Henry Hass (1906-1959): Geol. Soc. America Proc. 1960, p. 105-106, port., **1962**.

SOPER, EDGAR KIRKE.

1. (and Osborn, C. C.). The occurrence and uses of peat in the United States: U. S. Geol. Survey Bull. 728, 207 p., illus., **1922**. A general treatise on the origin and occurrence of peat includes those in Pennsylvania. Most are in glacial-till-filled basins in the northern part.

SOPPER, WILLIAM EDWARD, *see* Shields, Ronald R., 1.

SOREN, JULIAN, *see* Wood, Gordon Harry, Jr., 2, 6.

SOSMAN, ROBERT BROWNING.

1. Arthur Louis Day (1896-1960): Am. Philos. Soc. Yearbook 1960, p. 134-140, **1961**.

2. Memorial to Arthur Louis Day (1896-1960): Geol. Soc. America Bull., v. 75, no. 11, p. P145-P155, port., **1964**.

SOUTHWICK, DAVID LEROY.

1. (and Fisher, George Wescott). Revision of stratigraphic nomenclature of the Glenarm Series in Maryland: Maryland Geol. Survey Rept. Invs. 6, 19 p., illus., **1967**. Numerous references to exposures and problems in southeastern Pennsylvania are included. It is proposed that the name Wissahickon be retained to engulf all of the rocks below the Cardiff Conglomerate (Ordovician) and that lithofacies units be used in place of old formation names. A lithofacies map shows the upper pelitic schist to be present in much of Lancaster and York Counties below the Martic Line, and a little of the metagraywacke facies to the south is also included in the counties.

SPACKMAN, WILLIAM, *see also* Habib, Daniel, 2; Mansfield, Silas Peck, 1; Ting, Francis Ta-Chuang, 1.

1. (and Moses R. G.). The nature and occurrence of ash-forming minerals in anthracite, *in* Proceedings of the anthracite conference 1960: Pennsylvania State Univ. Mineral Industries Exper. Sta. Bull. 75, p. 1-13, illus., **1961**; discussion by Jack Aaron Simon, p. 13-15. The mineral content from 12 coal columns was analyzed. Geologic age and geography are correlated to some extent with the mineral matter. The coals can be petrographically divided into compositionally different zones.

SPALDING, CHARLES W., *see* Brown, Richard Willits, 1.

SPEECE, JACK H., *see also* Gettel, Phillip E. A., 5; Herbein, Jay T., 5.

1. Little Pit Cave . . . Huntingdon Co., Pa.: Shippensburg Grotto Newsletter, v. 2, no. 3, p. [23-24], illus., **1967**.
2. Puss Harbor Cave [Cumberland County]: Shippensburg Grotto Newsletter, v. 2, no. 3, p. [25], illus., **1967**.

SPELEO DIGEST.

1. [Map of] Big Ridge Cave (Mifflin County, Pennsylvania): Spelco Digest 1965, p. 167, illus., **1967**.

SPELMAN, ALLEN RATHJEN.

1. Stratigraphy of Lower Ordovician Nittany Dolomite in central Pennsylvania: PhD Thesis, Pennsylvania State Univ., **1965**; [abs.], Dissert. Abs., v. 26, no. 4, p. 2139-2140, **1965**; Pennsylvania Geol. Survey, 4th ser. Bull. G 47, 187 p., illus., **1966**. Three members are recognized, a lower Forge Union Member, a middle Shoenberger Member, and an upper Etna Furnace Member. Sections are measured, and analyses are made. Many fossils are described and illustrated.

SPICER, HERBERT CECIL.

1. Charles Edwin Van Orstrand [1870-1959]: Geophysics, v. 25, no. 2, p. 544-545, port., **1960**.

SPIEGEL, ZANE.

1. Base-flow hydrology of the Lehigh River Basin [abs.]: *Am. Geophys. Union Trans.*, v. 44, no. 1, p. 45, **1963**; *Ground Water*, v. 1, no. 3, p. 46, **1963**.

SPINK, WALTER JOHN, *see* Epstein, Anita G., 1.

STADNICHENKO, TAISIA MAXIMOVNA, 1894-1958, *see also* Zubovic, Peter, 1, 2.

1. (and Zubovic, Peter, and Sheffey, Nola Bewley). Beryllium content of American coals: *U. S. Geol. Survey Bull.* 1084 K, p. 253-295, **1961**. Included are analyses of coal from the Lower Kittanning bed in Armstrong and Indiana Counties. The Be content of each is 3.7 and 1.8 ppm respectively.

STAFFORD, KENNETH.

1. Durham Cave no. 2 (Bucks County, Pa.): *Nittany Grotto News*, v. 10, no. 8, p. 146-147, illus., **1962**.

STALEY, H. GENE, *see* Flesch, Gerald D., 1.

STARK, J. M., *see* Retcofsky, H. L., 1.

STARR, EILEEN M., *see* Stone, Ralph Walter, 1.

STATE GEOLOGISTS JOURNAL.

1. In memoriam—Wilbur Armistead Nelson, 1890-1969: *State Geologists Jour.*, v. 21, no. 1, p. 30-31, **1969**.

STEFANKO, ROBERT, *see also* Dutcher, Russell Richardson, 1, 2.

1. Subsurface disposal of mine water [Washington County] [abs.]: *Mining Engineering*, v. 20, no. 12, p. 60-61, **1968**.

STEINHART, JOHN SHANNON, *see* James, David Evan, 3.

STEINY, HOMER J.

1. Ralph Arnold (1875-1961): *Am. Assoc. Petroleum Geologists Bull.*, v. 45, no. 11, p. 1897-1900, port., **1961**.

STELLMACK, JOHN A., *see* White, William Blaine, 6, 8.

STERN, THOMAS WHITAL, *see also* Rankin, Douglas Whiting, 1.

1. (and Stieff, Lorin Rollins, and Klemic, Harry, and Delevaux, Maryse Helen). Lead-isotope age studies in Carbon County, Pennsylvania, *in* Geological Survey research 1960: *U. S. Geol. Survey Prof. Paper* 400 B, p. B45-B48, illus., **1960**. Age-dating by the U-Pb method on the disseminated uraninite in Mississippian sandstones of the Mount Pisgah uranium deposit in the Mauch Chunk Formation gives ages of 300-413 my. Discussions of the techniques conclude that the formation of the

deposits near the end of the Jurassic or early in the Cretaceous is mathematically and geologically possible.

2. (and Rose, Harry Joseph, Jr.). New results from lead-alpha age measurements [southeastern Pennsylvania]: *Am. Mineralogist*, v. 46, nos. 3-4, p. 606-612, illus., **1961**. New improvements in spectrochemical analysis give better dates for the Baltimore Gneiss from various locations in southeastern Pennsylvania. All are between 500 and 1,000 my old. The Swarthmore Granodiorite, from Philadelphia County is 480 my old, and the Wissahickon Schist, from Philadelphia County is between 500 and 880 my old.

STEVENS, GEORGE RICHARD.

1. Nature and distribution of S-planes in Maryland and southern Pennsylvania: PhD Thesis, Johns Hopkins Univ., **1960**.
2. Analysis and paragenetic history of anthraxolite in Ordovician slate [Northampton County], eastern Pennsylvania, in *Coal science—Advances in chemistry*, v. 55: Washington, D. C., Am. Chem. Soc., p. 91-115, illus., **1966**; discussions, p. 115-116. "Knots" of anthraxolite in Martinsburg slate are likely a result of viscous, humic parent substances having seeped into cavities of the sediments soon after deposition, and later having been upgraded by Taconic metamorphism.

STEWART, JOHN HARRIS, *see* Fischer, Richard Philip, 1.

STIEFF, LORIN ROLLINS, *see* Stern, Thomas Whital, 1.

STINGELIN, RONALD WERNER.

1. Late-glacial and post-glacial vegetational history in the north central Appalachian region: PhD Thesis, Pennsylvania State Univ., **1965**; [abs.], *Dissert. Abs.*, v. 26, no. 11, p. 6650, **1966**; *Geol. Soc. America Spec. Paper* 115, p. 214, **1968**.
2. (and Ames, H. Tate). Evidence for aeolian redeposition of Paleozoic sporomorphs, Bear Meadows Bog [Centre County], Pennsylvania [abs.]: *Geol. Soc. America Spec. Paper* 115, p. 295, **1968**.

STONE, A. V., *see* Nicolay, H. H., 1.

STONE, RALPH WALTER, 1876-1964, *see also* Smeltzer, Bernard L., 21, 34.

1. (and Starr, Eileen M.). Meteorites found in Pennsylvania: *Pennsylvania Geol. Survey*, 4th ser. Bull G 2, 35 p., illus., revised, **1967**; originally published 1932. Eight meteorites are known from Pennsylvania. Each is described, and a bit of background about its finding is given. They are: Pittsburgh, from Allegheny County; Bradford Woods, from Allegheny County; Mount Joy, from Adams County; Bald Eagle, from Lycoming County; Shrewsbury, from York County; New Baltimore, from Somerset County; Chicora, from Butler County; and Black Moshannon, from Centre County.

STOSE, GEORGE WILLIS, 1869-1960.

1. (and Ljungstedt, Olof Axel). Geologic map of the United States, 4 sheets: Washington, D. C., U. S. Geol. Survey, scale, 1:2,500,000, revised, **1960**; originally published 1932.

STRAHL, ERWIN OTTO, *see* Bates, Thomas Fulcher, 1.

STRAKA, JOSEPH J., 2D, *see* Lane, H. Richard, 1.

STUART, WILBUR TENNANT, *see also* Barnes, Ivan Hugh, 1.

1. (and Simpson, Thomas A.). Variations of pH with depth in anthracite mine-water pools in [northeastern] Pennsylvania, in Geological Survey research 1961: U. S. Geol. Survey Prof. Paper 424 B, p. B82-B84, illus., **1961**. Variations of pH with depth in numerous pools are cited; most show an increase in pH with depth, and no explanation is offered.
2. Hydrology of Northern Anthracite Field [northeastern Pennsylvania]: U. S. Geol. Survey Repts. Open File, 13 p., **1964** [not seen].
3. (and Schneider, William Joseph, and Crooks, James Walker). Swatara Creek Basin of southeastern Pennsylvania—an evaluation of its hydrologic system: U. S. Geol. Survey Water-Supply Paper 1829, 79 p., illus. incl. geol. map, **1967**.

STUCKENRATH, ROBERT, JR., *see* Ralph, Elizabeth K., 1.

STUIVER, MINZE.

1. (and Deevey, Edward Smith). Yale natural radiocarbon measurements, [Part] 6: Radiocarbon, v. 3, p. 126-140, **1961**. Charcoal from cave-fill in Lloyd's Rock Hole Cave in Bedford County is $11,300 \pm 1,000$ years old.

STURGEON, MYRON THOMAS.

1. New descriptions of hitherto inadequately known Pennsylvanian gastropods [Beaver County]: Jour. Paleontology, v. 38, no. 4, p. 740-748, illus., **1964**. *Trachydoma raymondi* from the Vanport Limestone in Beaver County is described and illustrated.

SUMMERSON, CHARLES HENRY.

1. Precambrian in Ohio and adjoining areas: Ohio Div. Geol. Survey Rept. Inv. 44, 16 p., illus., **1962**. Information from one well in Crawford County is used. Here the Precambrian is 7,899 feet deep and is granite gneiss. A contour map of the basement surface shows depths of over 12,000 feet to the basement predicted for southwestern Pennsylvania.

SURKAN, ALVIN JOHN, *see* Smart, J. Samuel, 1.

SVEC, HARRY JOHN, *see* Flesch, Gerald D., 1.

SWAIN, FREDERICK MORRILL, JR.

1. Early Middle Ordovician Ostracoda of the eastern United States—Part 2, Leperditellidae (part), Hollinacea, Kloedenellacea, Bairdiacea, and super-

- family uncertain: Jour. Paleontology, v. 36, no. 4, p. 719-744, illus., 1962; correction, no. 6, p. 1396. Many genera and species from the Union Furnace area, in Huntingdon County, and the Marion-Kauffman area in Franklin County, are described and illustrated. Two zones are represented, a lower *Bullatella kaufmanensis* and an upper *Monoceratella teres* zone.
2. Regional variation in organic geochemistry of [Devonian] Onondaga beds of Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 82, p. 202-203, 1965.
 3. Distribution of some organic substances in Paleozoic rocks of central Pennsylvania, in Coal science—Advances in Chemistry, v. 55: Washington, D. C., Am. Chem. Soc., p. 1-20, illus., 1966; discussions, p. 20-21. Hydrocarbons, carbohydrates, amino acids, and unidentified compounds of presumed aromatic or heteroaromatic nature are determined from marine rocks of Ordovician to Devonian age. A progressive increase in organic production of the seas is suggested.
 4. (and Palacas, James George, and Kraft, John Christian). High-calcium deposits of Cumberland Valley [Franklin and Cumberland Counties] Pennsylvania, in A symposium on the geology of industrial limestone and dolomite: Ohio Jour. Sci., v. 66, no. 2, p. 116-123, illus., 1966. High calcium limestones occur in the New Market Formation of Ordovician age. The better grades of stone average from 95 to 97 percent CaCO_3 . Two belts occur, one belt from beyond Carlisle to the Maryland border; this needs careful study as the structures are very complex.
 5. (and Rogers, Marion Alan). Stratigraphic distribution of carbohydrate residues in Middle Devonian Onondaga beds of [western] Pennsylvania western New York: Geochim. et Cosmochim. Acta, v. 30, no. 5, p. 497-509, illus., 1966. An area of high concentration, up to 392 ppm, occurs in northwestern Pennsylvania; this area received excessive contributions of organic matter at that time. A belt of low organic matter concentration to the east suggests a shelf where scavenger activity was high. The carbohydrate content of the Middle and Lower Onondaga is higher than that of the Upper Onondaga.
 6. (and Bratt, Judy M., and Kirkwood, Samuel). Carbohydrate components of some Paleozoic plant fossils: Jour. Paleontology, v. 41, no. 6, p. 1544-1554, illus., 1967. Specimens of *Lepidodendron* cf. *L. gaspianum* from the Mississippian Pocono Sandstone from Huntingdon County, and *Sigillaria* cf. *S. approximata* from the Permian Greene Formation in Greene County are included among many others. The acid-soluble monosaccharides were sought, and the composition seems to generally resemble that of their living representatives.
 7. (and Bratt, Judy M., and Kirkwood, Samuel). Possible biochemical evolution of carbohydrates of some Paleozoic plants: Jour. Paleontology, v. 42, no. 4, p. 1078-1082, illus., 1968. Fossil plant material from Greene, Bedford, and Clearfield Counties along with material from other places, is analyzed for carbohydrates. Some changes are noted in some groups which are related to stratigraphic position.

SWANSON, VERNON EMANUEL, *see also* Berryhill, Henry Lee, Jr., 1, 4, 5; Duncan, Donald C., 1; Ong, H. Lin, 1.

1. (and Berryhill, Henry Lee, Jr.). Geology of the Washington East Quadrangle [Washington County], Pennsylvania: U. S. Geol. Survey Geol. Quad. Maps of the U. S., Map GQ 334, scale, 1:24,000, **1964**. Pennsylvanian, Permian, and Quaternary rocks are mapped. Structure contours on the base of the Pittsburgh Coal are included. Coal is the major mineral resource.

SWARTZ, CHARLES KEPHART, 1861-1949.

1. (and Swartz, Frank McKim). Early Silurian formations of southeastern Pennsylvania: Geol. Soc. America Bull., v. 42, no. 3, p. 621-662, illus., **1931**. Sections are measured, and fossils are listed from the Rose Hill, Keefer, Rochester, McKenzie, Bloomsburg, Wills Creek, Inwood, Tuscarora, and Clinton Formations. Correlations are made.

SWARTZ, FRANK MC KIM, *see also* Swartz, Charles Kephart, 1.

1. Guide to the Horse Shoe Curve section between Altoona and Gallitzin, central Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. G 50, 56 p., illus., **1965**. A road long along the railroad right-of-way is given. Stops are made in all the systems from Pennsylvanian at the top to Devonian at the bottom.

SWEENEY, WILLIAM.

1. Apollo Clay Mine Cave [Armstrong County?] Netherworld News, v. 8, no. 6, p. 97-100, illus., **1960**.

SWEET, JOHN R.

1. [Map of] Hosterman's Pit Cave, Centre County: Nittany Grotto News, v. 12, no. 2, separate, **1963**; Speleo Digest 1963, separate, **1965**.
2. A 400 foot deep cave discovered in Pennsylvania—Big Ridge Cave, Mifflin County, Pennsylvania: Netherworld News, v. 12, no. 5, p. 66-68, illus., **1964**.

TALENT, JOHN A., *see* Boucot, Arthur James, 4.

TASCH, PAUL.

1. Conchostraeon genus *Anomalonema* in the American Pennsylvanian [Clearfield County]: Jour. Paleontology, v. 34, no. 2, p. 285-289, illus., **1960**. *Anomalonema (Pierrepruvostia) williamsi* from the shale above the Upper Kittanning Coal in Clearfield County is described and illustrated.

TAYLOR, ALFRED RALEIGH, *see* Klemic, Harry, 2.

TAYLOR, DWIGHT WILLARD, *see* Hibbard, Claude William, 1.

TAYLOR, HUGH PETTINGILL, JR.

1. Stable isotope studies of ultramafic rocks and meteorites, in Ultramafic and related rocks: New York, John Wiley and Sons, p. 362-372, illus.,

1967. The analysis of serpentized periodotite from Octorara Creek in Chester County is included with many others from other places. The D/H and O^{18}/O^{16} ratio are used to suggest possible origins for the rocks.

TAYLOR, MICHAEL E., *see* Yochelson Ellis Leon, 3.

TAYLOR, THOMAS NORWOOD, *see* Delevoryas, Theodore, 1.

TERRELL, JOHN UPTON.

1. The man who re-discovered America—biography of John Wesley Powell [1834-1902]: New York, Weybright and Talley, 279 p., illus., **1969**.

TEXTORIS, DANIEL ANDREW, *see* Dennison, John Manley, 4.

THAYER, THOMAS PRENCE.

1. (and Miller, Mary H.). Chromite in the United States, exclusive of Alaska and Hawaii: U. S. Geol. Survey Mineral Invs. Resources Map MR 26, scale, 1:3,168,000, separate text, **1962**. Several deposits in the State Line District, Lancaster and Chester Counties, are noted. A few deposits also occur in Delaware County.
2. Chemical and structural relations of ultramafic and feldspathic rocks in Alpine intrusive complexes, *in* Ultramafic and related rocks: New York, John Wiley and Sons, p. 222-229, illus., **1967**. The Baltimore Gabbro-State Line [Chester and Lancaster Counties] ultramafic complex is shown to be geochemically and petrologically similar to other complexes throughout the world, and therefore these and the others must have a common origin—the mantle?

THOMAS, DAVID, 1776-1859.

1. Travels through the western country in the summer of 1816 . . . : Auburn, New York, David Rumsey, 329 p., **1819** [not seen].

THOMAS, GABRIEL.

1. An historical and geographical account of the province and county of Pensilvania and of west-New-Jersey in America: London, A. Baldwin, 1698; reprinted, Cleveland, Ohio, Burrows Brothers, 83 p., illus., **1903**. A early account of the Commonwealth includes descriptions of some of the mineral resources in southeastern Pennsylvania. Iron ore, limestone, and copper are noted, as is coal suspected from sediment in the river.

THOMAS, HENRY DIGHTON.

1. Ray Smith Bassler [1878-1961]: Geol. Soc. London Proc. 1961-62, no. 1602, p. 148-150, **1962**; Nature, v. 195, no. 4846, p. 1049, **1962**.

THOMAS, HERMAN HOIT, *see* Zartman, Robert Eugene, 2.

THOMPSON, ALLAN MC MASTER.

1. Facies succession in a marine-continental transition in the Upper Ordovician of central Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 115, p. 297, **1968**.
2. Sedimentologic and geochemical studies of the Bald Eagle-Juniata color boundary, central Pennsylvania: PhD Thesis, Brown Univ., **1968**; [abs.], Dissert. Abs. Internatl. B, v. 30, no. 1, p. 261B-262B, **1969**.
3. Clay-mineral diagenesis in redbed sequence, Juniata Formation, central Pennsylvania [abs.]: Am. Assoc. Petroleum Geologists Bull., v. 53, no. 3, p. 745-746, **1969**.
4. Upper Ordovician fluvial deposition in the central Appalachians [abs.]: Geol. Soc. America Abstracts with Programs 1969, pt. 1, p. 60-61, **1969**.
5. Variation in stratigraphic position of drab-red color boundary in Upper Ordovician redbed sequence, central Appalachians [abs.]: Geol. Soc. America Spec. Paper 121, p. 295-296, **1969**.

THOMPSON, DALE R.

1. (and Emrich, Grover Harry). Hydrogeologic considerations for sealing coal mines: Pennsylvania Dept. Health, Div. Sanitary Engineering Pub. 23, 21 p., illus., **1969**. Examples from Pennsylvania are used to show the influence of geology and ground water on the problems of sealing abandoned coal mines to prevent oxidation of pyrite and the resulting production of acid mine water which pollutes the streams.

THOMPSON, GLENN, *see* Clark, Lawrence, 1.

THOMPSON, RICHARD ROGERS.

1. Commercial possibilities of some Cambrian and Ordovician limestones and dolomites in Blair and Centre Counties, Pennsylvania: Pennsylvania State Univ. Mineral Industries Exper. Sta. Bull. 77, p. 12-28, illus., **1961**. Samples of the Cambrian Pleasant Hill and Gatesburg Formations and the Ordovician Larke and Stonehenge Formations show that some members, chemically, would be satisfactory as metallurgical fluxes as well as for cement.
2. Lithostratigraphy of the Middle Ordovician Salona and Coburn Formations in central Pennsylvania: PhD Thesis, Pennsylvania State Univ., **1961**; [abs.], Dissert. Abs., v. 22, no. 1, p. 231-232, 1961; Pennsylvania Geol. Survey, 4th ser. Bull. G 38, 154 p., illus., **1963**. Detailed measured sections are included. Zones of contemporaneity, provided by meta-bentonite layers and fossil layers, are recognized. Three lithofacies are identified.

THOMPSON, T. D.

1. (and Brindley, George William). Absorption of pyrimidines, purines, and nucleosides by Na-, Mg-, and Cu(II)-illite. (Clay-organic studies XVI): Am. Mineralogist, v. 54, nos. 5-6, p. 858-868, illus., **1969**. Illite from the Oswego Formation at Skytop, Monroe County was used in experiments to demonstrate absorption values. In the Na and Mg

saturated illite, organic absorption occurs mainly in acid conditions by cation exchange.

THOMSON, KEITH STEWART.

1. A new Devonian fish (Crossopterygii: Rhipidista) considered in relation to the origin of the Amphibia: Postilla, no. 124, 13 p., illus., 1968. *Hynieria lindae* from the Oswayo Formation of Clinton County is described and illustrated. It has structures which resemble those of the true Amphibia and is due to parallelism in evolution of the Amphibia and the rhizodontid Rhipidistia stocks.

THOMSON, ROBERT D., *see also* O'Neil, Bernard J., Jr., 2.

1. (and Otte, Mary E., and Ela, Robert E.). The mineral industry of Pennsylvania in 1958: Pennsylvania Geol. Survey 4th ser. Inf. Circ. 36, 47 p., illus., 1960; reprinted from U. S. Bur. Mines Minerals Yearbook 1958, v. 3, p. 779-825, illus., 1959.
2. (and Otte, Mary E., and Ela, Robert E.). The mineral industry of Pennsylvania [in 1959]: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 43, 48 p., illus., 1961; reprinted from U. S. Bur. Mines Minerals Yearbook 1959, v. 3, p. 827-874, illus., 1960.
3. (and Otte, Mary E., and Ela, Robert E.). The mineral industry of Pennsylvania in 1960: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 49, 43 p., [1961]; reprinted from U. S. Bur. Mines Yearbook 1960, v. 3, p. 845-889, illus., 1961.
4. (and Otte, Mary E., and Ela, Robert E.). The mineral industry of Pennsylvania in 1961: Pennsylvania Geol. Survey, 4th ser. Inf. Circ. 50, 42 p., illus., [1963]; reprinted from U. S. Bur. Mines Minerals Yearbook 1961, v. 3, p. 871-912, illus., 1962.

THORNBURY, WILLIAM DAVID.

1. Regional geomorphology of the United States: New York, John Wiley and Sons, 609 p., illus., 1965. A review of the physiographic provinces includes those of Pennsylvania. The geological basis for the divisions is shown by illustrations.

THOUMSIN, S. F., *see* Depman, Albert Joseph, 1.

THURSTON, PHILLIPS C.

1. Petrography of the [Precambrian] Baltimore Gneiss at Glen Mills, Chester County, Pennsylvania: MS Thesis, Bryn Mawr College, 1965.

TIHEN, JOSEPH ANTON.

1. A review of New World fossil bufonids: Am. Midland Naturalist, v. 68, no. 1, p. 1-50, illus., 1962. *Bufo americanus americanus* Holbrook from Pleistocene cave deposits in Bedford, Westmoreland, and Blair Counties, and *B. woodhousei fowleri* from sub-Recent cave deposits in Westmoreland County are discussed and illustrated.

TILLING, ROBERT INGERSOLL, *see* Gottfried, David, 2.

TILLYARD, ROBIN JOHN, 1881-1937.

1. Kansas Permian insects, Part 7, the Order Mecoptera: *Am. Jour. Sci.*, 5th ser. v. 11, no. 2, p. 133-164, illus., **1926**. *Mercaptor pusillus*, from the lower Pottsville Formation in Schuylkill County, is redescribed and reillustrated.

TILTON, GEORGE ROBERT, *see also* Bass, Manuel Nathan, 1.

1. (and Wetherill, George West, and Davis, Gordon Leslie, and Bass, Manuel Nathan). 1,000-million-year-old minerals from the eastern United States and Canada: *Jour. Geophys. Research*, v. 65, no. 12, p. 4173-4179, illus., **1960**. Measurements have been made on muscovite, biotite, microcline, uraninite, and zircon. Samples of Baltimore Gneiss from Montgomery and Chester Counties are included. The Rb-Sr dates vary from 380 to 1,010 my, reflecting a great metamorphic event. The isotopic lead ages vary from 950 to 1,120 in zircon, and are more likely nearer the age of the rocks.
2. (and Wetherill, George West, and Davis, Gordon Leslie). Summary of discussion of pre-Cambrian mineral ages from the Appalachian province [abs.], in *Geochronology of rock systems*: New York Acad. Sci. Annals, v. 91, art. 2, p. 420, **1961**.

TILTON, J. G.

1. Channel sandstones of the Pittsburgh coal horizon [south Pennsylvania]: *Soc. Mining Engineers Trans.*, v. 238, no. 4, p. 403-405, illus., **1967**. The origin and distribution of sand-filled channels are described. Methods of detecting their presence from the influence they have on the surrounding coal are emphasized. Lithofacies maps of the overlying units are especially helpful.

TING, FRANCIS TA-CHUANG.

1. (and Spackman, William). Coal lithotypes—their relationships to the environments of coal-forming swamps [abs.]: *Geol. Soc. America Spec. Paper* 87, p. 177, **1966**.
2. The petrology of the Lower Kittanning coal in western Pennsylvania: PhD Thesis, Pennsylvania State Univ., **1967**; [abs.], *Dissert. Abs. B*, v. 28, no. 6, p. 2487B, **1967**.
3. Reflectance of disseminated vitrinite as a diagenetic indicator in sedimentary rocks [western Pennsylvania] [abs.]: *Geol. Soc. America Abstracts with Programs* 1969, pt. 1, p. 61, **1969**.

TOMIKEL, JOHN C.

1. Land surface in Erie County, Pennsylvania: MS Thesis, Syracuse Univ., **1962**.
2. (and Shepps, Vincent Chester). The geography and geology of Erie County, Pennsylvania: *Pennsylvania Geol. Survey*, 4th ser. *Inf. Circ.*

56, 64 p., illus., **1967**. This is a popular account of the geology of the county. A cursory description of the bedrock (surface and subsurface), water and mineral resources, and various geographical aspects are included. Small-scale geologic and surficial-deposit maps are included also.

3. Structure of Fayette County, Trip 2 of Field trip guide to Fayette County, Pennsylvania: Harrisburg, Pennsylvania Council for Geography Education, p. 13-20, illus., **1969**. A very general summary of the stratigraphy and structure of the county is followed by a field trip road log; the trip is 30 miles long, from Brownsville to Ohiopyle Falls of the Youghiogheny River. Brief descriptions of the geological features along the way are given.
4. Trip 2, Structures of Fayette County, in Field trip guide to Fayette County, Pennsylvania: Pennsylvania Council for Geography Education 16th Ann. Spring Conf., p. 13-20, illus. [**1969**]. A survey of the physiography of the county is followed by a popular description of the folds as they are seen along Route 40 from Brownsville eastward to Laurel Hill. A discussion of the occurrence of coal and its influence on the settlement of Fayette County is also included as Part 1.

TORREY, PAUL DWIGHT, *see* Fettke, Charles Reinhard, 14.

TOTTEN, STANLEY MARTIN, *see* White, George Willard, 1, 2, 4.

TOWNES, HARRISON L.

1. Shallow oil play might revive Titusville [Venango County] area: Oil and Gas Jour., v. 63, no. 1, p. 136, 140-143, illus. incl. port., **1965**. A general summary of the Devonian geology of the region includes a description of the successful sand-fracturing techniques in use elsewhere which might be applicable in this area.

TOWNSEND, WILLIAM P.

1. A report on the minerals of Chester County that are used in the arts—a paper read before the West Chester Lyceum, March 30, **1839** [not seen].

TRESCOTT, PETER C., *see* Wanless, Harold Rollin, 2, 3.

TREXLER, JOHN PETER, *see also* Arndt, Harold Harry, 2; Wood, Gordon Harry, Jr., 2, 3, 6, 7, 11, 12, 14.

1. Geologic mapping with aerial photographs in the Anthracite Region of [north]eastern Pennsylvania [abs.]: Geol. Soc. America Bull., v. 71, no. 12, pt. 2, p. 2026-2027, **1960**.
2. (and Wood, Gordon Harry, Jr., and Arndt, Harold Harry). Angular unconformity separates Catskill and Pocono Formations in western part of Anthracite Region [northeastern] Pennsylvania, in Geological Survey research 1961: U. S. Geol. Survey Prof. Paper 424 B, p. B84-B88, illus., **1961**. Detailed mapping shows the red and gray rocks below the massive Pocono Sandstone underlie the sandstone unconformably, and are

included in the Catskill Formation. Heretofore, the red rocks were considered Catskill and the gray rocks were considered Pocono. Some of the Catskill Formation may therefore be Mississippian in age.

3. (and Wood, Gordon Harry, Jr., and Arndt, Harold Harry). Uppermost Devonian and Lower Mississippian rocks of the western part of the Anthracite Region of [north]eastern Pennsylvania, in Geological Survey research 1962: U. S. Geol. Survey Prof. Paper 450 C, p. C36-C39, illus., **1962**. The uppermost member of the Catskill Formation, the Specht Kopt, underlies the Beckville Member of the Mississippian Pocono Formation which in turn underlies the Mount Carbon Member of the Pocono. Each member is described.
4. (and Wood, Gordon Harry, Jr., and Arndt, Harold Harry). Progress of U. S. Geological Survey investigations in the Anthracite Region of [northeastern] Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 37, p. 295-299, **1963**. Over half of the region has been mapped. Facies changes have been recognized, as has an angular unconformity and numerous folded and non-folded thrust faults.
5. The geology of the Klingerstown, Valley View, and Lykens Quadrangles, Southern Anthracite Field, [northeastern] Pennsylvania: U. S. Geol. Survey Repts. Open File, 2 vols., 519 p., illus. incl. atlas of geol. maps, **1964**. A complete geological description of the region is given. Devonian-Pennsylvanian rocks are described. Folds and faults are the dominant structures. Anthracite coal is the chief mineral resource.
6. The geology of the Klingerstown, Valley View, and Lykens Quadrangles, Southern Anthracite Field [northeastern] Pennsylvania, 2 vols.: PhD Thesis, Univ. Michigan, **1964**; [abs.], Dissert. Abs., v. 26, no. 3, p. 1596-1597, **1965**.
7. (and Wood, Gordon Harry, Jr.). Geologic map [and section] of the Klingerstown Quadrangle, Northumberland, Schuylkill, and Dauphin Counties, Pennsylvania: U. S. Geol. Survey Geol. Quad. Maps of the U. S., Map GQ 700, scale, 1:24,000, **1963**. Silurian-Mississippian rocks and Quaternary alluvium are mapped. Folding is predominant.
8. (and Wood, Gordon Harry, Jr.). Geologic map [and sections] of the Lykens Quadrangle, Dauphin, Schuylkill, and Lebanon Counties, Pennsylvania: U. S. Geol. Survey Geol. Quad. Maps of the U. S., Map GQ 701, scale, 1:24,000, **1963**. Silurian-Pennsylvanian rocks are present, as is Quaternary alluvium. Folds are the dominant structures.
9. (and Wood, Gordon Harry, Jr.). Geologic map [and sections] of the Valley View Quadrangle, Schuylkill and Northumberland Counties, Pennsylvania: U. S. Geol. Survey Geol. Quad. Maps of the U. S., Map GQ 699, scale, 1:24,000, **1963**. Silurian-Pennsylvanian rocks and Quaternary alluvium are mapped. Folding is very pronounced.

TRUMBULL, JAMES VAN ALLEN.

1. Coal fields of the United States, sheet 1: Washington, D. C., U. S. Geol. Survey, scale 1:5,000,000, **1960**.

TSCHUDY, ROBERT HAYDN.

1. An Upper Cretaceous deposit in the Appalachian Mountains [Franklin County], in Geological Survey research 1965; U. S. Geol. Survey Prof. Paper 525 B, p. B64-B68, illus., **1965**. Numerous samples of Late Cretaceous spores and pollen from the Pond Bank deposit are illustrated. They come from a black, sandy clay from the old mine dump and are associated with a lignite deposit.

TSUSUE, AKIO.

1. Mineral aspects of the Grace magnetite deposit [Berks County]: Pennsylvania Geol. Survey, 4th ser. Bull. M 49, 10 p., illus., **1964**. From calcite-dolomite geothermometry and mineral paragenesis, it is inferred that the calcite veins in the dolomite formed prior to the magnetite emplacement, at about 650°C whereas the magnetite was emplaced at less than about 500°C.

TUREKIAN, KARL KAREKIN, *see also* Carr, Michael H., 1; Kharkar, D. P., 1.

1. The chromium and nickel distribution in basaltic rocks and eclogites: Geochim. et Cosmochim. Acta, v. 27, no. 7, p. 835-846, illus., **1963**. Diabase sills from several areas in southeastern Pennsylvania are included in analyses of basaltic rocks. The Cr and Ni contents are shown in ppm. As part of a world-wide sample, the covariance of the two is constant, suggesting a preservation of the Cr/Ni ratio from source of the basaltic magma.
2. The meteorite and tektite collections of Yale University: Postilla, no. 101, 16 p., illus., **1966**. Fragments of the Mount Joy (Adams County), Pittsburgh (Allegheny County), and Shrewsbury (York County) meteorites are present.

TURNER, THOMAS D.

1. (and Landis, Charles, Jr., and Smeltzer, Bernard L.). Pennsylvania Cave list: MAR Bull. 5, p. 49-72, **1960**. Caves in Pennsylvania are listed by county, map scale, location, and degree of difficulty.
2. Dump Cave (Mifflin County, Pennsylvania): Speleo Digest 1959, p. I73-I74, illus., **1961**.
3. Madisonburg Cave (Centre County, Pennsylvania): Speleo Digest 1959, p. I69, illus., **1961**.

TWENHOFEL, WILLIAM STEPHENS, *see* Butler, Arthur Pierce, Jr., 1.

TYSON, NATALIE SMITH, *see* Popenoe, Peter, 1.

UDAGAWA, S., *see* Williams, Eugene Griffin, 10.

ULTEIG, JOHN R.

1. Upper Niagaran and Cayugan stratigraphy of northeastern Ohio and adjacent areas [northwestern Pennsylvania]: Ohio Div. Geol. Survey Rept. Inv. 51, 48 p., illus., **1964**. Some data come from wells in extreme northwestern Pennsylvania. Small-scale structure contour and isopachous maps are included for the various Silurian units. No details are included, however.

UNITED STATES ARMY CORPS OF ENGINEERS.

1. Geology and foundation conditions on Lake Erie-Ohio River canal—Pittsburgh-Ashtabula route via Beaver-Mahoning-Grand River valleys, v. 2: Pittsburgh, U. S. Army Engineers District, p. 1-12, illus., 1965 [not seen].
2. Geologic [background], Part 10 of Tamaqua [Schuylkill County] Pennsylvania, local protection plan, Chapter 2 of Part 3 of Development of water resources in Appalachia, v. 6: Cincinnati, Ohio, Office of Appalachian Studies p. 13-17, illus., 1969. A tunnel to divert water from Wabash Creek to the Little Schuylkill River, and thus by-passing Tamaqua, is proposed. Drill cores along the proposed route through Sharp Mountain are analyzed. Silurian to Pennsylvanian rocks are encountered as are underground mine workings.
3. Geologie [background], Part 12 of St. Petersburg reservoir project [Clarion County], Chapter 11 of Development of water resources in Appalachia, v. 9: Cincinnati, Ohio, Office of Appalachian Studies, p. 112-120, illus., 1969. The geology of the proposed damsite and reservoir is outlined. Mississippian and Pennsylvanian rocks are present. The dam would rest upon strong sandstones and no leakage would be anticipated. Much construction aggregate is nearby.
4. Geology, Part 10 of Otocsin project, West Branch, Susquehanna River [Clearfield County], Chapter 19 of Part III of Report for development of water resources in Appalachia [v. 11]: Cincinnati, Ohio, Office of Appalachian studies, p. 13-17, illus., 1969. A cursory description of the geology of the proposed damsite on Anderson Creek, for the reservoir for the Otocsin Recreation complex, is given. The dam would be founded on Mississippian and Pennsylvanian sandstones and should be very sound.

UNITED STATES BUREAU OF MINES, *see also* U. S. Geological Survey, 6.

1. Appalachian region oilfield reservoir investigations, Venango Group First Sand, Goodwill Hill-Grand Valley field, Southwest Township, Warren County, Pa.: Producers Monthly, v. 25, no. 7, p. 2, 4-5; illus., 1961. The petrography, porosity, and permeability of the Devonian Venango First Sand is discussed in an otherwise engineering report on the oil-field reservoir characteristics.
2. Appalachian region oilfield reservoir investigations—Glade Sand, Youngsville-Five Points field, Sugar Grove, Farmington, and Brokenstraw Townships, Warren County, Pa.: Producers Monthly, v. 26, no. 10, p. 8-10, illus., 1962. Petrography and geophysical logs of the Devonian Glade Sand are included in a report otherwise designed to investigate secondary recovery potential properties of the unit.
3. Appalachian region oilfield reservoir investigations—Venango Group, Second Sand, Foster-Reno-Oil City field, Reno Pool, Sugar Creek Township, Venango County, Pa.: Producers Monthly, v. 28, no. 5, p. 12-15, illus., 1964. The geology and petrography of the sand from a core is described in an otherwise engineering report on the secondary-recovery potential of the formation.

4. Mineral resources in Appalachia, Part 1 of Appendix I of Report for development of water resources in Appalachia [v. 24]: Washington, D. C., U. S. Bur. Mines, p. I pt. 1, 1-83, illus., **1969**. A general survey of mineral resources of Appalachia includes Pennsylvania. Much of the data is summarized from U. S. Geol. Survey Prof. Paper 580.
5. Site examination reports, Part 4 of Appendix I of Report for development of water resources in Appalachia [v. 24]: Washington, D. C., U. S. Bur. Mines, p. I pt. 4, 1-193, illus., **1969**. The mineral resources of specific areas which would be affected by watershed-control measures are cursorily described. Many of the sites are in Pennsylvania.
6. Appalachian region oilfield reservoir investigations—Kane Sand, Kane Field, Highland Twp., Elk County, Pa.: *Producers Monthly*, v. 28, no. 4, p. 12-15, illus., **1964** [not seen].

UNITED STATES COAST AND GEODETIC SURVEY.

1. Horizontal intensity chart of the United States, 1965—Lines of equal magnetic horizontal intensity and equal annual change (United States 3077h): Washington, D. C., U. S. Dept. Commerce, scale, 1:5,000,000, **1965**.
2. Isoclinic chart of the United States, 1965—Lines of equal magnetic inclination (dip) and equal annual change (United States 3077i): Washington, D. C., U. S. Dept. Commerce, scale 1:5,000,000 **1965**.
3. Vertical intensity chart of the United States, 1965—Lines of equal magnetic vertical intensity and equal annual change (United States 3077z): Washington, D. C., U. S. Dept. Commerce, scale, 1:5,000,000, **1965**.

UNITED STATES DEPARTMENT OF THE INTERIOR.

1. Natural resources of Pennsylvania: Washington, D. C., U. S. Dept. Interior, 53 p., illus., **1968**. [not seen].

UNITED STATES GEOLOGICAL SURVEY, *see also* American Association of Petroleum Geologists, 1; American Geophysical Union, 1.

1. (and Am. Assoc. Petroleum Geologists). Tectonic map of the United States, exclusive of Alaska and Hawaii, 2 sheets: Washington, D. C., U. S. Geol. Survey, scale, 1:2,500,000, revised **1961**; originally published 1944.
2. Engineering geology of the Northeast Corridor, Washington, D. C., to Boston, Massachusetts—[Part 1], Bedrock geology: U. S. Geol. Survey Misc. Geol. Invs. Map I 514 A, scale 1:2,500,000, text, **1967**. One map of many prepared for Department of Transportation planning includes bedrock lithology of that part of southeastern Pennsylvania east of Lancaster, Lebanon, Lehigh, and Northampton counties. Engineering properties are discussed.
3. Engineering geology of the Northeast Corridor, Washington, D. C., to Boston, Massachusetts—[Part 2], Coastal Plain and surficial deposits: U. S. Geol. Survey Misc. Geol. Invs. Map I 514 B, scale, 1:2,500,000, text, **1967**. Cretaceous Coastal-Plain sediments and river alluvium along

- Delaware River are mapped; engineering properties are discussed. Cross sections of the valley fill of the Delaware River are included also.
4. Engineering geology of the Northeast Corridor, Washington, D. C., to Boston, Massachusetts—[Part 3], Earthquake epicenters [1534-1965], geothermal gradients, and excavations and borings: U. S. Geol. Survey Misc. Geol. Invs. Map I 514C, scale 1:1,500,000, text, **1967**. Nine epicenters have been identified in southeastern Pennsylvania. None is very large.
 5. Productive aquifers and withdrawals from wells—National Atlas of the United States, Sheet 126: Washington, D. C., U. S. Geol. Survey, scale, 1:7,500,000, **1967**.
 6. (and United States Bureau of Mines). Mineral resources of the Appalachian region: U. S. Geol. Survey Prof. Paper 580, 492 p., illus. incl. geol. map, **1968**. A geological summary of the Appalachian Mountain region (including all but southeastern Pennsylvania) is followed by a review of each of the individual resources, currently economical and otherwise.
 7. Aeromagnetic map of the Harrisburg-Scranton area, northeastern Pennsylvania: U. S. Geol. Survey Geophys. Invs. Map GP 669, scale, 1:250,000, **1969**.

VAIL, R. S., *see* Wanless, Harold Rollin, 2.

VALLELY, JAMES L., *see* Kerr, James R., 3.

VANCE, MAURICE M.

1. Charles Richard Van Hise [1857-1918]—scientist progressive: Madison, State Hist. Soc. Wisconsin, 246 p., illus., **1960**.

VANDALE, AUGUST E.

1. Subsidence, a real or imaginary problem?: Mining Engineering, v. 19, no. 9, p. 86-88, illus., **1967**. It is a real problem, resulting in the requirement that a company mining coal underground must leave calculated amounts of coal behind to serve as support for structures which are on the surface above it. The engineering problems encountered are discussed, and examples from the Pittsburgh area are cited.

VAN ECK, WILLIAM ADOLPH.

1. (and Engle, Carl F.). Notes on the clay mineralogy of Appalachian Upland soils: West Virginia Acad. Sci. Proc. 1964, v. 36, p. 157-165, illus., **1964**. Clay minerals in soils from many places, including western Pennsylvania, are given in tables. From the assemblages, certain deductions regarding weathering sequences and environments can be made.

VAN HOUTEN, FRANKLYN BOSWORTH.

1. Cyclic sedimentation and the origin of analcime-rich Upper Triassic Lockatong Formation, west-central New Jersey and adjacent [southeastern] Pennsylvania: Am. Jour. Sci., v. 260, no. 8, p. 561-576, illus.,

- 1962.** Groups of detrital and chemical cycles occur in rhythmic couples 325 to 350 feet thick. These resulted from alternating climatic conditions. The chemical cycles result when the basin was closed.
2. Cyclic lacustrine sedimentation, Upper Triassic Lockatong Formation, central New Jersey and adjacent [southeastern] Pennsylvania, in Symposium on cyclic sedimentation: Kansas Geol. Survey Bull. 169, v. 2, p. 497-531, illus., **1964** [1966]. Cycles of "detrital" deposition and "chemical" deposition resulted from the waxing and waning of the Lockatong Lake, presumably due to cyclic variation in climate.
 3. Composition of Triassic Lockatong and associated formations of Newark Group, central New Jersey and adjacent [southeastern] Pennsylvania: Am. Jour. Sci., v. 263, no. 10, p. 825-863, illus. incl. geol. map, **1965**. The Stockton Arkose (500 feet thick) generally contains more Na- than K-feldspar. Lockatong lacustrine deposits (3,750 feet thick) occur in detrital and chemical cycles averaging 15 feet thick, the latter occurring when the lake was closed. The upper Brunswick mudstone and siltstone (at least 6,000 feet thick) accumulated on mud flats.
 4. Crystal casts in Upper Triassic Lockatong and Brunswick Formations [southeastern Pennsylvania]: Sedimentology, v. 4, no. 4, p. 301-313, illus., **1965**. Numerous pseudomorphs after glauberite are present. They grew in soft mud as the lake waters were enriched in calcium, sodium, and sulfate which then crystallized as glauberite or possibly anhydrite. These were then, in the Lockatong muds, replaced by dolomite and analcime from solutions released during the dewatering of the mud.
 5. Origin of sodium-rich Triassic lacustrine deposits, New Jersey and [southeastern] Pennsylvania [abs.]: Am. Assoc. Petroleum Geologists Bull., v. 49, no. 3, p. 361, **1965**.
 6. Field trip no. 4. Late Triassic Newark Group, north central New Jersey and adjacent [southeastern] Pennsylvania and New York, in Geology of selected areas in New Jersey and eastern Pennsylvania: New Brunswick, New Jersey, Rutgers Univ. Press, p. 314-347, illus., **1969**. A general description of the stratigraphy and sedimentation of the group precedes a field trip, of which none of the stops are in Pennsylvania.

VAN LIEU, JUNIUS ADRIAN, *see also* Patterson, Elmer Davisson, 2, 4.

1. (and Patterson, Elmer Davisson). Coal resources of Lawrence County, Pennsylvania: U. S. Geol. Survey Bull. 1143 B, p. B1-B33, illus. incl. geol. map, **1964**. Mississippian and Pennsylvanian rocks are present, and glacial till covers the northern part of the county. There are 12 coal beds over 14 inches thick containing about 398 million tons of recoverable bituminous coal. Analyses are included.

VILETTO, JOHN, JR.

1. Channel morphology in southwestern Pennsylvania: PhD Thesis, Pennsylvania State Univ., **1968**; [abs.], Dissert. Abs. Internatl. B, v. 30, no. 3, p. 1207B-1208B, **1969**.

VILLAUME, J. F.

1. (and Freedman, Jacob L., and Al-Mishwt, Ali). Geochemical and geophysical study of mafic and ultramafic rocks in Mine Ridge [Lancaster County], southeastern Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 43, p. 169-171, illus., 1969. Lenses of ultramafic and mafic rocks have been remapped. Thin and polished section petrographic, geochemical, magnetic and gravimetric studies are underway. Geochemically, nothing occurs above background. Magnetic and gravimetric anomalies occur along the margins of one lens.

VINE, JAMES DAVID.

1. Geology of uranium in coaly carbonaceous rocks: U. S. Geol. Survey Prof. Paper 356-D, p. 113-170, illus., 1962. Discussions of the geochemistry of uranium as it occurs in carbonaceous rocks of all sorts includes brief descriptions of its occurrence in Clearfield and Cambria Counties. The uranium content is very low here.

VLISSIDES, SOPHIE DRAKOULIS.

1. (and Quirin, Barbara A.). Oil and gas fields of the United States, exclusive of Alaska and Hawaii: Washington, D. C., U. S. Geol. Survey, scale, 1:2,500,000, 2 sheets, 1964.

VON HAKE, CARL A.

1. (and Cloud, William K.). United States earthquakes 1964: Washington, D. C., U. S. Coast and Geodetic Survey, 91 p., illus., 1966. An earthquake of magnitude 4.5 occurred in southeastern Pennsylvania on May 12, 1964.

VORHIS, ROBERT CARSON, *see* McGarr, Arthur, 1.

VOZOFF, KEEVA, *see* Lahman, Howard S., 1.

WAENKE, HEINRICH, *see* Chang, C., 1.

WAGNER, MARY EMMA.

1. Granulite facies rocks near Wayne [Delaware County] Pennsylvania: MS Thesis, Bryn Mawr College, 1966.

WAGNER, R. H.

1. Upper Westphalian and Stephanian species of *Alethopteris* from Europe, Asia Minor, and North America: Rijks Geol. Dicnst Med., ser. C v. 3, pt. 1, no. 6, 618 p., illus., 1968. A monograph on the entire genus includes illustrations and descriptions of many from Pennsylvanian rocks in Pennsylvania.

WAGNER, WALTER RICHARD, *see also* Kelley, Dana Robineau, 5; Lytle, William Stuckley, 5-8, 11, 14, 17, 19, 20.

1. Subsurface Cambro-Ordovician stratigraphy of northwestern Pennsylvania and bordering states: Pennsylvania Geol. Survey, 4th ser. Prog. Rept.

- 156, 22 p., illus., **1961**. Nomenclature problems for the rocks in the state are reviewed. Correlations with outcropping rocks in other states is attempted. Two widespread unconformities are present, one in the Beekmantown, and the other at the top of the Beekmantown Formation.
2. Cambro-Ordovician stratigraphy of central and south-central Pennsylvania, *in* Tectonics and Cambrian-Ordovician stratigraphy in the central Appalachians of Pennsylvania—Pittsburgh Geol. Soc. Guidebook Field Conf. 1963: Pittsburgh, Pittsburgh Geol. Soc., p. 3-11, illus., **1963**. Limestone formations from Late Cambrian to Early Ordovician age are described in preparation for a three day field trip. Two belts of exposure, 50 miles apart, are correlated with difficulty; the Chazy-Beekmantown contact may be a lithofacies boundary.
 3. Correlation of Susquehanna Group in part of northeastern Pennsylvania, *in* Symposium on Middle and Upper Devonian stratigraphy of Pennsylvania and adjacent states: Pennsylvania Geol. Survey, 4th ser. Bull. G 39, p. 63-77, illus., **1963**. The Group, from Bradford to Pike Counties, can be subdivided on several bases into numerous subdivisions. Seven major lithic units are fitted into pre-existing terminology, and correlations are made with outcropping surface units.
 4. Gas exploration in northeastern Pennsylvania, Appendix 2, *in* Stratigraphy and structure of the Upper and Middle Devonian rocks in northeastern Pennsylvania—Field Conf. Pennsylvania Geologists 28th: Harrisburg, Pennsylvania Bur. Topog. and Geol. Survey, p. 37-42, illus., **1963**. A brief description of the occurrence of gas in Oriskany and pre-Oriskany rocks is given. The first gas was discovered in 1930, and exploration has continued ever since. Generalized data from 47 wells are tabulated.
 5. Bedford County Oriskany (Ridgeley) gas fields, *in* Oil and gas developments in Pennsylvania in 1965: Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 172, p. 44-48, illus., **1966**. Five gas fields are present in this Valley and Ridge area. They are on thrust-faulted anticlines in the Broad Top synclinorium. cursory descriptions of fields are included as are several small-scale structure contour maps of rocks in several of them.
 6. Pennsylvanians must delve into rocks of ancient age: Oil and Gas Jour., v. 64, no. 50, p. 152-158, illus., **1966**. This is a summary of the Cambrian to Silurian aged rocks in the subsurface of western Pennsylvania, with an exhortation for exploration in them for petroleum and natural gas.
 7. Stratigraphy of the Cambrian to Middle Ordovician rocks of central and western Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. G 49, 156 p., illus., **1966**. The subsurface Lower and Middle Ordovician strata of western Pennsylvania are correlated with the outcropping units in central Pennsylvania: Three Cambrian sandstone units are recognized, and the Lower Ordovician rocks thin to absence toward the northwest where Middle Ordovician rocks overlie the Cambrian rocks unconformably. Sections are measured.
 8. (and Lytle, William Stuckley). Geology of Pennsylvania's oil and gas: Pennsylvania Geol. Survey, 4th ser. Educ. Ser. no. 8, 28 p., illus., **1968**. This is a popular account of the origin and occurrence of oil and gas, followed by a description of its presence in Pennsylvania.

9. Representative gamma-ray logs from shallow and deep wells, western Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Prog. Rept. 178, 2 sheets, text, **1969**. The Temple well, 9,919 feet deep in Mercer County, is logged lithologically and by gamma-rays. Precambrian to Mississippian rocks are present. Correlation of the gamma-ray logs with the lithology and with several other wells in western Pennsylvania is attempted to show that the technique will work in those areas where lithologic correlations are nebulous.

WALKER, FORREST E.

1. (and Hartner, Florine E.). Forms of sulfur in U. S. coals: U. S. Bur. Mines Inf. Circ. 8301, 51 p., illus., **1966**. Coals from many places in Pennsylvania are analyzed for percent of sulfur as sulfate, as pyrite, and as organic sulfur. Numerous coals from numerous mines are included.

WALKER, GEORGE W.

1. (and others). Geology of uranium-bearing veins in the conterminous United States: U. S. Geol. Survey Prof. Paper 455 A-F, 120 p., illus., **1963**. Uranium-bearing veins occur in Berks and in Northampton counties. None is of economic value, and very little data is included.

WALKER, JOHN, *see* Gill, Harold Edward, 1.

WALKER, KENNETH RUSSELL.

1. Lithofacies map of Lower Mississippian clastics of eastern and east-central United States: Am. Assoc. Petroleum Geologists Bull., v. 46, no. 1, p. 105-111, illus., **1962**. Lower Mississippian rocks are thickest in the southeastern area of their occurrence and thin outward in all directions. Sandstone predominates in the central part, and finer elastic material occurs toward the western edge of the state.

WALKER, LUCIAN H.

1. James H[enry] Gardner (1883-1964): Tulsa Geol. Soc. Digest, v. 32, p. 27, port., **1964**.

WALKER, PHILIP CALEB.

1. The forest sequence of the Hartstown bog area in [Crawford County] western Pennsylvania: PhD Thesis, Univ. Pittsburgh, **1958**; [abs.], Desert. Abs., v. 18, no. 6, p. 1959, **1958**; (and Hartman, Richard Thomas): Ecology, v. 41, no. 3, p. 461-474, illus., **1960**. Three pollen profiles from the bog reveal a forest sequence, after deglaciation, of five major successions that suggest accompanying climatic changes. Radiocarbon dates for the pine maximum are $9,310 \pm 150$ years BP, and the oldest sediments are, by extrapolation, 13,000 years old.

WALKER, PHILIP LEROY, JR., *see* Nandi, S. P., 1.

WALLACE, PAUL A. W.

1. George Washington and the Wisconsin glacier, 1753: Pennsylvania Archaeologist, v. 24, nos. 3-4, p. 96-105, illus., **1954**. The Wisconsin moraine in northwestern Pennsylvania provided a dry path for George Washington and his party during their trip in wet weather from the Ohio River to Presqu'île on Lake Erie.

WANLESS, HAROLD ROLLIN, 1898-1970, *see also* Baroffio, James Richard, 2.

1. Depositional basins of some widespread Pennsylvanian coal beds in the United States, *in* Third conference on the origin and constitution of coal: Halifax, Nova Scotia Dept. Mines and Nova Scotia Research Foundation, p. 94-125, illus., [1961]; discussions, p. 125-128. Eight coal beds in western Pennsylvania can be correlated with coal beds in the Eastern Interior coal field on the basis of uniqueness of basin, surrounding rocks, and other geologically recognizable features. Maps show the regional distribution of the various basins.
2. (and Campos, A. Rocha, and Horne, John C., and Trescott, Peter C., and Vail, R. S., and Baroffio James Richard and Orlopp, Donald Easton). Late Paleozoic deltas in the central and eastern United States [abs.]: Am. Assoc. Petroleum Geologists Bull., v. 49, no. 3, p. 362, 1965.
3. (and Baroffio, James Richard, and Trescott, Peter C.). Conditions of deposition of Pennsylvanian coal beds, *in* Environments of coal deposition: Geol. Soc. America Spec. Paper 114, p. 105-142, illus., 1969. The Brookville, Stockton, and Richardson coals of southwestern Pennsylvania are cited as examples of coals containing partings. The partings result from material having been washed into the coal swamps by flooding streams. Such coals are at the edge of the swamps, as the rest of the coal does not contain partings.

WARING, GERALD ASHLEY.

1. Thermal springs of the United States and other countries of the world—a summary, revised by Reginald R. Blankenship and Ray Bentall: U. S. Geol. Survey Prof. Paper 492, 383 p., illus., 1965. Only one hot spring occurs in Pennsylvania; this is in Perry County, near Sherman Dale. The water is 72°F and flows at 90 gallons per minute.

WARK, JOHN WILLIAM, *see also* McCarren, Edward F., 1.

1. Sediment load of streams in the [Appalachian] region, *in* Water resources of the Appalachian region, Pennsylvania to Alabama: U. S. Geol. Survey Hydrol. Invs. Atlas HA-198, sheet 8, scale, 1:2,500,000, text, 1965. Average annual sediment yield in tons per square mile shows Pennsylvania to be largely between 20 and 250. This reflects the erosion in the region, which is relatively low.

WARMAN, JAMES C., *see* Klemie, Harry, 2.

WARNER, JEFFREY.

1. (and Al-Mishwt, Ali). Variations of the basal spacing of muscovite with metamorphic grade in southeastern Pennsylvania: Pennsylvania Acad. Sci. Proc. 1968, v. 42, p. 193-202, illus., 1969. Basal spacing was determined from 75 muscovites from southeast of Coatesville and from 57 muscovites from southeast of York. Changes in *d* spacing related to metamorphic grade are detected. Temperatures and pressures of metamorphism are deduced from the values if the variation is due to muscovite-paragonite solid-solution.

WARREN, CHARLES REYNOLDS, *see* Denny, Charles Storow, 3.

WASER, PAUL, *see* Hartline, Don, 1.

WASSERBURG, GERALD JOSEPH, *see also* Zartman, Robert Eugene, 1.

1. (and Mazor, Emanuel, and Zartman, Robert Eugene). Isotopic and chemical composition of some terrestrial natural gases, *in* Earth science and meteoritics: Amsterdam, North-Holland Pub. Co., p. 219-240, illus., **1963**. Gas from Devonian rocks in northwestern Pennsylvania, and others from elsewhere, are analyzed. The isotopic composition of argon and carbon is included. The atmospheric argon composition is compatible with a single solubility model.

WASSON, JOHN TAYLOR.

1. (and Kimberlin, Jerome). The chemical classification of iron meteorites—[Part] 2, Irons and pallasites with germanium concentrations between 8 and 100 ppm: *Geochim. et Cosmochim. Acta*, v. 31, no. 10, p. 2065-2093, illus., **1967**. The New Baltimore iron contains 6.48 percent Ni, 20.3 ppm Ga, and 37.3 ppm Ge. These figures, and others from other meteorites, are used in a new classification based on the Ga and Ge contents. New Baltimore's composition is more or less unique.

WATERS, AARON CLEMENT.

1. Memorial to Bailey Willis (1857-1949): *Geol. Soc. America Bull.*, v. 73, no. 7, p. P55-P72, port., **1962**.

WATSON, EDWARD HAHN, *see* Busé, Maria Luisa, 1.

WATSON, KENNETH DE PENCIER.

1. Kimberlites of eastern North America, *in* Ultramafic and related rocks: New York, John Wiley and Sons, p. 312-323, illus., **1967**. The kimberlite dikes in Indiana and Fayette Counties are examined petrographically and compared with similarly-occurring non-organic ultrabasic rocks. They were emplaced at relatively low temperatures as an accumulation of crystals transported by a highly fluid liquid rich in CO₂ and H₂O.

WEAVER, CHARLES EDWARD.

1. Interpretive value of heavy minerals from bentonites: *Jour. Sed. Petrology*, v. 33, no. 2, p. 343-349, illus., **1963**. Heavy-mineral separates from many montmorillonitic clays, including K-bentonites from the Ordovician of Pennsylvania, indicate that the primary volcanic bentonites contain biotite, zircon, apatite, and sometimes titanite. Secondary bentonites, not of volcanic origin, commonly contain tourmaline, garnet, and muscovite.

WEAVER, KENNETH NEWCOMER.

1. Why geology in the cement industry?: *Soc. Mining Engineers Trans.*, v. 232, no. 1, p. 49-54, illus., **1965**. An example from the quarry of the

Medusa Cement Company in York County is cited to show the value of geological information in detecting potential problems for cement manufacturing. A knowledge of the complex geology will permit better quality control.

WEAVER, OSCAR DAVID, JR.

1. Revival of the Appalachians: Oil and Gas Jour., v. 60, no. 8, p. 88-97, illus. incl. port., **1962**. A general discussion of the geology of the northern part of the Appalachian Basin includes western Pennsylvania. Details of the occurrence of oil and gas in different stratigraphic units are included.
2. North flank of Appalachian [Basin] set for testing: Oil and Gas Jour., v. 63, no. 36, p. 216-219, illus. incl. port., **1965**. A general discussion of the Cambrian and Ordovician rocks of the area include northwestern Pennsylvania. Here the lower Paleozoic rocks are below 5000 feet deep and are on the southeast flank of the Algonquin Arch. A small scale map shows the structure on the top of the pre-Knox unconformity.
3. Drillers go after shallow targets in [northwestern] Pennsylvania: Oil and Gas Jour., v. 64, no. 14, p. 222-225, illus. incl. port., **1966**. Sands in the Upper Devonian in the old oil-field areas are being re-examined. There are over 50 potential pay horizons within the Titusville-Bradford trend area. New techniques plus economic circumstances make the area again attractive.

WEBB, DAVID KNOWLTON, JR.

1. Vertical variations in the clay mineralogy of sandstone, shale, and under-clay members of Pennsylvania cyclothems: PhD Thesis, Univ. Illinois, **1966**; [abs.], Dissert. Abs., v. 22, no. 5, p. 1589, **1961**.

WEBB, ELMER JAMES.

1. Cambrian exploration in Appalachia, Part 1: Oil and Gas Jour., v. 67, no. 44, p. 100-101, illus., . . . Part 2, no. 45, p. 266-267, illus., **1969**. A general discussion of Cambrian sedimentary history in the Appalachians includes that of Pennsylvania. The emphasis is on the deposition of the Rome Sandstone. Small-scale isopach maps are included.
2. Geologic history of the Cambrian System in the Appalachian Basin, *in* Proceedings of the Technical Sessions, Kentucky Oil and Gas Assoc. thirty-third annual meeting . . . : Kentucky Geol. Survey, ser. 10 Spec. Pub. 18, p. 7-15, illus., **1969**. A general review of Cambrian history in the basin includes that of Pennsylvania. Clastic deposition, combined with early tectonic activity in the basin, created an excellent environment for traps. Examples are cited from Pennsylvania. Small-scale isopach maps of the Cambrian Series are included.

WEBB, ROBERT WALLACE.

1. Memorial to William John Miller (1880-1965): Geol. Soc. America Proc. 1966, p. 303-307, port., **1968**.

WEBER, JON NOEL EARL, *see also* Keith, Mackenzie Lawrence, 1; Williams, Eugene Griffin, 11.

1. Carbon isotope ratios in dolostones—some implications concerning the genesis of secondary and “primary” dolostones: *Geochim. et Cosmochim. Acta*, v. 28, no. 8, p. 1257-1265, illus., 1964. The C^{12}/C^{13} ratios, in conjunction with Al and Cl ion content of some Paleozoic dolostones (including the Ordovician Nittany Dolomite from Centre County), suggest that some may have originated in areas receiving appreciable terrestrial detritus. The O^{18}/O^{16} ratios are also used in the evaluation.
2. (and Williams, Eugene Griffin, and Keith, Mackenzie Lawrence). Paleo-environmental significance of carbon isotopic composition of siderite nodules in some shales of Pennsylvanian age [western Pennsylvania]: *Jour. Sed. Petrology*, v. 34, no. 4, p. 814-818, illus., 1964. The C^{13}/C^{12} ratios of penecontemporaneous siderite nodules from shales showed complete separation of the terrestrial and marine groups, and a partial separation of restricted marine and marine groups. Some of the anomalies can be explained by contamination by secondary calcite and possible errors of environmental classification.
3. Trace element composition of dolostones and dolomites and its bearing on the dolomite problem: *Geochim. et Cosmochim. Acta*, v. 28, no. 11, p. 1817-1868, illus., 1964. Trace element analyses of numerous “primary” and “secondary” dolomites from many places and many ages, including the Ordovician Nittany Dolomite from Centre County, are made. Various differences are cited, and more work is needed. The Nittany is “secondary”.
4. Oxygen isotope fractionation between coexisting calcite and dolomite in the freshwater Upper Carboniferous Freeport Formation [western Pennsylvania]: *Nature*, v. 207, no. 5000, p. 972-973, 1965. The dolomite was invariably enriched in O-18 with respect to modern and Tertiary calcites. Equilibration of the oxygen isotopes of calcite and dolomite prior to lithification may be indicated.
5. (and Bergenback, Richard Edward, and Williams, Eugene Griffin, and Keith, Mackenzie Lawrence). Reconstruction of depositional environments in the Pennsylvanian Vanport Limestone basin [western Pennsylvania] by carbon isotope ratios: *Jour. Sed. Petrology*, v. 35, no. 1, p. 36-48, illus., 1965. Detailed variations of the carbon isotope ratio have been determined in the Vanport Limestone and bordering transitional marine zones. There is a general inverse relationship between average C-13 content with proximity to the ancient shorelines and deltaic distributaries.

WEBSTER, GARY DEAN, *see* Lane, H. Richard, 1.

WEEDEN, HARMER A.

1. Soil mapping for highway engineers—a recommended procedure for the State of Pennsylvania: *Pennsylvania State Univ. Engineering Research Bull. B* 82, 141 p., illus., 1962. Air photos can be used to determine soils, and, if the bedrock is known, something of the soils’ characteristics can be predicted. From this, highway planning can be facilitated. Various origins of soils result in varying degrees of ease of recognition.

WEIS, PAUL LESTER, *see* Cameron, Eugene Nathan, 1.

WELLS, JAMES AERTSEN.

1. Pleistocene geology of Union County, Pennsylvania: MS Thesis, Pennsylvania State Univ., **1960**.

WELLS, JOHN WEST, *see* Engeln, Oskar Diedrich von, 1.

WELLS, RICHARD B.

1. Clastic dikes in the Catskill Formation near Millerstown [Perry County], Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 43, p. 187-190, illus., **1969**. Wedges of grayish-red sandy siltstone-filled cracks in the Duncannon Member of the Catskill Formation were filled from the top. The dikes and overlying associated siltstone lenses may be a part of crevasse splay deposits which flowed over and filled insipient slump crevices in overbank alluvial sediments on the floodplain of the Catskill Delta.

WERNER, MATHEW L., *see also* Wise, Donald Underkofler, 14.

1. (and Moss, John Hall). The large amount of alluvium in valley deposits near Lancaster [Lancaster County] Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 43, p. 183-184, illus., **1964**. The floor of Little Conestoga Creek is underlain by at least 14 feet of colluvium which is overlain by only 3 or 4 feet of alluvial fill. The colluvium is believed to have been deposited during a period of extreme periglacial frost action as its source is the nearby Antietam Quartzite.

WEST, JAMES.

1. Kelly Hole [Cave, Franklin County]: York Grotto Newsletter, v. 4, no. 1, p. 9, 12, illus., **1962**.

WEST VIRGINIA UNIVERSITY SCHOOL OF MINES.

1. Coal-associated minerals of the United States—Part 1, Pennsylvania and Maryland . . . : U. S. Dept. Interior Office of Coal Research, Coal Research and Devel. Rept. 8, part 1, [89 p.], illus., **1965** [not seen].

WETHERILL, GEORGE WEST, *see* Bass, Manuel Nathan, 1; Tilton, George Robert, 1, 2.

WHAITE, RALPH H., *see* Ash, Simon Harry, 2, 6.

WHEELER, HARRY EUGENE.

1. Early Paleozoic tectono-stratigraphic patterns in the United States: Internatl. Geol. Cong. 21st, Proc. Sec. 8, p. 47-56, illus., **1960**. Continent-wide marine invasions beginning in the late Precambrian and culminating during the Ordovician are described. The general circumstances in Pennsylvania are included; the influence of the Taconic Orogeny is present.

2. Catskill and Acadian discontinuity, in Symposium on Middle and Upper Devonian stratigraphy of Pennsylvania and adjacent states: Pennsylvania Geol. Survey, 4th ser. Bull. G 39, p. 103-113, illus., 1963. Regional studies suggest that the Catskill Formation truncates the Hamilton-Tully-Cenessee-Portage-Chemung sequence rather than being intertongued with these formations. As such, it is younger and post-Acadian. The Catskill may therefore be, in part, of Mississippian age.
3. Post-Sauk and pre-Absaroka Paleozoic stratigraphic patterns in North America: Am. Assoc. Petroleum Geologists Bull., v. 47, no. 8, p. 1497-1526, illus., 1963; discussion by Lawrence Louis Sloss, v. 48, no. 1, p. 122-124, 1964; reply by author, p. 124. Subdivisions of this interval are identified. Some are recognized in Pennsylvania; the Kaskaskia Sequence is more easily recognized as two sequences which are called the Piankasha and the Tamaroa. These are the Upper Ordovician and Silurian intervals.

WHIELDON, CHARLES E., JR.

1. Appalachian region oilfield reservoir investigations, Glade, Clarendon, and Gartland sands, Morrison Run field, Mead Township, Warren County, Pa.: Producers Monthly, v. 30, no. 9, p. 9-11, illus., 1966. The petrography and geophysical logs of the sand units are described in an otherwise engineering report on the secondary recovery potential of these Devonian Sandstone formations.
2. (and Overbey, William K., Jr.). Appalachian region oilfield reservoir investigations, Venango Group, First, Lytle, and Second sands, Walnut Bend pool, Cornplanter Township, Venango Co., Pa.: Producers Monthly, v. 30, no. 6, p. 2-5, illus., 1966. Core analyses well logs, geology, and petrography of the Devonian sands are included in an otherwise engineering report on the secondary recovery potential of the reservoir.

WHITCOMB, LAWRENCE.

1. Geomorphic environment, in Structure and stratigraphy of the Reading Hills and Lehigh Valley in Northampton and Lehigh Counties, Pennsylvania—Field Conf. Pennsylvania Geologists 26th: Bethlehem, Pennsylvania, Lehigh Univ., p. 4-13, 1961. A summary description of the physiography of the region includes a description of the valley, ridges, and the Reading Prong. The origin of the various features, especially peneplanation of the region, is discussed. Small hills, resulting from the resistance of Triassic fanglomerates to erosion, are also present in the region.
2. *Dolatocrinus* from the Centerfield [coral zone], Monroe County, Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 36, p. 38-41, illus., 1962. Four specimens of *Dolatocrinus* from the Centerfield biostrome in the Hamilton Formation are described and illustrated. These are additions to the Hamilton fauna and an extension of the geographic range of the genus.
3. Hugh Richard Gault, 1915-1961: Jour. Geol. Education, v. 10, no. 1, p. 21, 1962.

WHITE, BERNARD L., see Bromery, Randolph Wilson, 29.

WHITE, CHARLES DAVID, 1862-1935.

1. Fossil alga from the Chemung of New York, with remarks on the genus *Haliserites* Sternberg: New York State Mus. Bull. 52, p. 593-605, illus., **1902**. *Thamnocladus clarkei* from Devonian rocks in Wyoming County was originally called *Haliserites dechenianus*. *Taeniocrada* is proposed for those species of *Haliserites* from the Catskill Formation near Factoryville, Wyoming County.

WHITE, ELIZABETH L.

1. (and White, William Blaine, and Hagenbuch, M. Jay, and Hagenbuch, Keith). Seilhammer Cave, Huntingdon County: Nittany Grotto News, v. 10, no. 1, p. 8-9, illus., **1961**.
2. (and White, William Blaine). Dynamics of sediment transport in limestone caves: Natl. Speleol. Soc. Bull., v. 30, no. 4, p. 115-129, illus., **1968**. Examples of underground stream erosion, transportation, and deposition are cited from various caves in the Loyalhanna Limestone in Chestnut Ridge, southwestern Pennsylvania. Mechanical transport occurs in all stages of cave development.

WHITE, G., *see* Kuo, John Tsung Fen, 1.

WHITE, GEORGE WILLARD, *see also* Goldthwait, Richard Parker, 1.

1. (and Totten, Stanley Martin). Wisconsinan age of the Titusville Till (formerly called "Inner Illinoian"), northwestern Pennsylvania: Science, v. 148, no. 3667, p. 234-235, illus., **1965**. Peat from near Titusville, Crawford County, has a radiocarbon age of $31,400 \pm 2,100$ years, so that the overlying till must be late Early Wisconsinan, and is called the Titusville Till.
2. (and Totten, Stanley Martin). Pre-Late Wisconsinan drifts in northwestern Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 101, p. 282, **1968**.
3. Pleistocene deposits of the northwestern Allegheny Plateau, U. S. A.: Geol. Soc. London Quart. Jour., v. 124, pt. 2, no. 494, p. 131-149, illus., **1969**; discussion, p. 149-151. Six different till sheets are identified. The earlier ones were discovered recently in coal strip-mining excavations. The lowermost is pre-Illinoian and is everywhere thoroughly weathered. Two are Illinoian and two, the bulk of the tills, are Wisconsinan. The Illinoian Titusville Till is newly named.
4. (and Totten, Stanley Martin, and Gross, David L.). Pleistocene stratigraphy of northwestern Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. G 55, 88 p., illus., **1969**. Seven distinct tills are identified and described. The oldest is probably Early Pleistocene in age. The Titusville Till is the most extensive and is radiometrically dated as Wisconsinan. Trend surface analyses of its composition are included.

WHITE, WALTER FINCH.

1. (and Lindholm, Gerald Franklin). Water resource investigations relating to the Schuylkill River restoration project, October 1947-December

1949: Harrisburg, Pennsylvania Dept. Forests and Waters, 125 p., illus., 1950. A general water-resources study includes brief descriptions of the Schuylkill River drainage basin, with emphasis upon the nature of the rocks and the sediments in the streams. Much tabular data about suspended sediment in the river is included.

WHITE, WALTER STANLEY.

1. Marland Pratt Billings—an appreciation, *in* Studies of Appalachian geology—northern and maritime: New York, Interscience Publishers, p. xi-xv, port., 1968.

WHITE, WILLIAM BLAINE, *see also* Shuster, Evan T., 1; White, Elizabeth L., 1, 2.

1. Geological notes on western Pennsylvania caves: MAR Bull. 5, p. 5-12, illus., 1960; Speleo Digest 1960, p. II I-II 9, illus., 1962. A general summary of the geology of western Pennsylvania explains the relationship of the outcrop of limestones (mostly the Vanport and Loyalhanna) to anticlines. Caves of the Loyalhanna are good examples of those formed by static ground water.
2. New caves in western Pennsylvania: MAR Bull. 5, p. 13-48, illus., 1960. Numerous caves are described and mapped; they are catalogued by county, and most are in Westmoreland and Fayette Counties.
3. Terminations of passages in Appalachian caves as evidence for a shallow phreatic origin *in* Origin of limestone caves—a symposium: Natl. Speleol. Soc. Bull., v. 22, pt. 1, p. 43-53, illus., 1960. Caves from central Pennsylvania are cited as examples to demonstrate that caves tend to develop horizontally in spite of structure and lithology; the position of the water table is apparently the dominant controlling factor. Structure and lithology seem merely to modify the ground plan and passage cross section.
4. Cave mineral studies, 1955-1960 [abs.]: Natl. Speleol. Soc. NSS News, v. 19, no. 8, p. 94, 1961.
5. Con Cave (Westmoreland County, Pennsylvania): Speleo Digest 1960, p. I44, I46, I51, illus., 1962.
6. (and Stellmack, John A.). Chemistry of karst groundwater in Brush Valley [Centre County] central Pennsylvania [abs.]: Natl. Speleol. Soc. Bull., v. 26, no. 2, p. 78, 1964.
7. (and Willingham, C., and Kelley, R.). [Map of] McConnellstown Quarry Cave, Huntingdon County: Nittany Grotto News, v. 14, no. 3, cover, 1965.
8. (and Stellmack, John A.). Seasonal fluctuations in the chemistry of karst groundwater [abs.], *in* Internatl. Cong. Speleology, 4th, Summ. lectures: Ljubljana, Speleol. Soc. Yugoslavia, p. 64, 1965 [not seen].
9. Sulfate mineralogy in some caves in the United States [abs.]: *in* Internatl. Cong. Speleology, 4th, Summ. lectures: Ljubljana, Yugoslavia Speleol. Soc., p. 63-64, 1965 [not seen].
10. Correlation of caves and erosion surfaces in the southern Cumberland Valley of [south-central] Pennsylvania [abs.]: Natl. Speleol. Soc. Bull., v. 28, no. 2, p. 92-93, 1966.

WHITEHEAD, DONALD REED.

1. Palynology and Pleistocene phytogeography of unglaciated eastern North America, in *The Quaternary of the United States*: Princeton, New Jersey, Princeton Univ. Press, p. 417-432, illus., **1965**. A general summary of the nature of vegetation during and after Pennsylvania. All the information comes from pollen analyses of bog deposits.

WHITLEY, GILBERT P.

1. The Nomenclature Zoologicus and some new fish names: Australian Naturalist, **1940** [not seen]. *Americaspis* is proposed to replace *Palaeaspis* Claypole, 1885 which are Silurian fish from the Bloomsburg Formation in Perry County.

WHITMORE, FRANK CLIFFORD, JR.

1. Memorial to Albert Williams Postel (1909-1966): Geol. Soc. America Proc. 1966, p. 341-346, port., **1968**.

WHITNEY, JOSIAH DWIGHT, 1819-1896, *see* Hall, James, 1.

WHITNEY, PHILIP ROY.

1. (and Hurley, Patrick Mason). The problem of inherited radiogenic strontium in sedimentary age determinations: Geochim. et Cosmochim. Acta, v. 28, no. 4, p. 425-436, illus., **1964**. Samples from several places in Pennsylvania, and others from elsewhere, are dated at 398 ± 12 my, about 15 percent different from published dates determined on igneous rocks. The small error is believed due to the relative youth of the rocks in the source area.

WHITTINGTON, HARRY BLACKMORE.

1. Phylogeny and distribution of Ordovician trilobites: Jour. Paleontology, v. 40, no. 3, p. 696-737, illus., **1966**. Ordovician trilobite faunas on a worldwide scale are discussed, and Pennsylvania, being a part of the world, is included. Specific locations are not included as North America is considered as a unit. The Ordovician trilobite fauna is uniform throughout the continent.

WIER, KAREN ELIZABETH.

1. Amphibolites in the Wissahickon Formation of the [southeastern] Pennsylvania-Delaware Piedmont region: PhD Thesis, Bryn Mawr College, **1963**; [abs.], Dissert. Abs., v. 25, no. 4, p. 2455, **1964**.

WIETRZYCHOWSKI, J. F.

1. Subsurface correlation of Upper Devonian lithostratigraphy in northeastern Pennsylvania and southeastern New York, in *Symposium on Middle and Upper Devonian stratigraphy of Pennsylvania and adjacent states*: Pennsylvania Geol. Survey, 4th ser. Bull. G 39, p. 43-50, illus., **1963**. Correlations of Devonian rocks encountered in wells from Columbia County northeastward are made. A generalized sequence from black

and gray shale upward through shale siltstone, then through siltstone, and finally into sandstone and conglomerate is recognized overlying the Onondaga Formation. The units thin to the northeast.

2. The Sweet Arrow Fault in northeastern Pennsylvania, Appendix 3, in *Stratigraphy and structure of the Upper and Middle Devonian rocks in northeastern Pennsylvania—Field Conf. Pennsylvania Geologists*, 28th: Harrisburg, Pennsylvania Bur. Topog. and Geol. Survey, p. 43-44, illus., **1963**. Faulting and evidence of faulting in sub-Marcellus sandstones have a general N 65° E trend which parallels the Sweet Arrow Fault of central Pennsylvania which has been traced toward the northeast.

WIGNALL, THOMAS K.

1. Generalized Bayesian classification functions—K classes [southeastern Pennsylvania]: *Econ. Geology*, v. 64, no. 5, p. 571-574, illus., **1969**. An example of the use of this technique to take into account *a priori* probabilities and to minimize expected losses due to miscalculation is given from the classification of mineral deposits in southeastern Pennsylvania. Eight functions (metals) are used. The main questionable features are the relevance of the data and the sample sizes.

WILHELM, CLARENCE JOHN, *see* Fettke, Charles Reinhard, 14.

WILLARD, BRADFORD.

1. Stratigraphy of the Cambrian sedimentary rocks of [south]eastern Pennsylvania: *Geol. Soc. America Bull.*, v. 72, no. 12, p. 1765-1776, illus., **1961**. The sequence is, from bottom to top: Hardyston, Limesport, and Allentown Formations. All are carbonates save for the Hardyston which is quartzite. The total thickness is about 3,000 feet.
2. Pennsylvania geology summarized: *Pennsylvania Geol. Survey*, 4th ser. Educ. Ser. no. 4, 17 p., illus. incl. geol. map, revised [**1962**]; originally published 1935. This is a popular account of the geological history of Pennsylvania preceded by a discussion of the basic principles of geology.
3. Geology and wars: *Pennsylvania History*, vol. 30, no. 3, p. 393-419, illus., **1963**. A general summary of the influence of geology, mainly physiography, on warfare, includes many examples from Pennsylvania. The Gettysburg battle is perhaps the best known, but influences in the French and Indian war are also cited.
4. Memorial to Ralph Walter Stone (1876-1964): *Geol. Soc. America Bull.*, v. 75, no. 12, p. P169-P173, port., **1964**.
5. Pioneer geologic investigations in Pennsylvania: *Pennsylvania History*, v. 32, no. 3, p. 237-253, illus., **1965**. This is a popular account of some early geological observations within the state. Early accounts of iron-furnace operation, petroleum, and casual geomorphologic observations are recounted. The account ends with the establishment of the Second Survey.
6. Geology at Lehigh University, its history, 1866-1966: Bethlehem, Lehigh Univ., Dept. Geology, 34 p., **1966**. A summary of the origin and

contributions of the Geology Department at this famous university is presented. Geology was first offered in 1866.

7. Memorial to Dean Benjamin McLaughlin (1901-1965): *Geol. Soc. America Bull.*, v. 77, no. 2, p. P23-P25, port., 1966.

WILLIAMS, EUGENE GRIFFIN, *see also* Ferm, John Charles, 1, 2, 4, 6; Reidenouer, David R., 2, 3; Weber, Jon Noel Earl, 2, 5.

1. Marine and fresh water fossiliferous beds in the Pottsville and Allegheny Groups of western Pennsylvania: *Jour. Paleontology*, v. 34, no. 5, p. 908-922, illus., 1960. Twelve environmental faunal zones are recognized. Extensive faunal lists of invertebrates are included. Marine and restricted marine fossils occur in dark gray shales above many of the coals, and fresh-water fossils, mainly estherids, are found in the shales above certain coals; ostracods and small gastropods are found in limestones below these coals. Many are illustrated.
2. Relationship between the stratigraphy and petrography of Pottsville sandstones and the occurrence of high-alumina Mercer Clay [western Pennsylvania]: *Econ. Geology*, v. 55, no. 6, p. 1291-1302, illus., 1960. Where the clay was deposited on topographic highs it was leached to diaspore. It was never deposited in the low areas where the Upper Conoquenessing Sandstone was deposited instead.
3. (and Griffiths, John Cedric). The application of statistical methods in prospecting for high-alumina clay: *Pennsylvania State Univ. Mineral Industries Exper. Sta. Bull.* 77, p. 29-34, illus., 1961. The purpose of this paper is to refine and further develop petrographic criteria for locating topographic highs of Pennsylvanian deposition inasmuch as the high alumina clay was deposited on these high areas; these are areas where the coals are thin or absent in western Pennsylvania.
4. (and Ferm, John Charles). Sedimentary facies in the Pottsville and Allegheny rocks of western Pennsylvania [abs.]: *Geol. Soc. America Spec. Papar* 68, p. 296-297, 1962.
5. (and Keith, Mackenzie Lawrence). Relationship between sulfur in coals and the occurrence of marine roof beds [western Pennsylvania]: *Econ. Geology*, v. 58, no. 5, p. 720-729, illus., 1963. The Lower Kittanning Coal shows regional sulfur-content variations which are statistically related to the regional changes in overburden lithology. The Upper Freeport Coal, overlain by the same type of rock everywhere, has a constant sulfur content. The presence or absence of marine waters influence the sulfur in the underlying coals.
6. (and Ferm, John Charles, and Guber, Albert Lee, and Bergenback, Richard Edward). Cyclic sedimentation in the Carboniferous of western Pennsylvania—Field Conf. *Pennsylvania Geologists*, 29th: University Park, Pennsylvania State Univ., 35 p., illus., 1964. Four cycles of sedimentation, including coal formations, in the Allegheny Formation are described in preparation for a field trip. The cycles result from eustatic and tectonic changes of base level. The field trip is two days long and makes nine stops between Phillipsburg and Sligo. Each stop is extensively described; there is no road log of the trip between the stops, however.

7. (and Ferm, John Charles, and Bergenback, Richard Edward). Factors controlling the variation of the Vanport Limestone in western Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 76, p. 179, **1964**.
8. (and Ferm, John Charles). Sedimentary facies in the lower Allegheny rocks of [north] western Pennsylvania: Jour. Sed. Petrology, v. 34, no. 3, p. 610-614, illus., **1964**. An explanation is proposed for the variations in thickness, composition, and stratigraphy of coals, limestone, and underclays of the lower 100 feet of the Allegheny Group (called the Clarion Formation). Stability in some areas and differential subsidence and sedimentation in others accounts for much of the variation.
9. (and Guber, Albert Lee, and Johnson, Arvid M.). Rotational slumping and the recognition of disconformities: Jour. Geology, v. 73, no. 3, p. 534-546, illus., **1965**. Historical and physical analysis of slump features in the lower Allegheny rocks of western Pennsylvania have permitted recognition of disconformities in sections where beds are parallel and apparently transitional. Variation of relief on the disconformity strongly effects the composition and texture of superjacent rocks. Well-drained higher areas are characterized by thin coals and residual clays whereas lower elevations contain transported clays, black shales, and carbonaceous sandstones and siltstones.
10. (and Bergenback, Richard Edward, and Falla, William S., Jr., and Udagawa, S.). Origin of some Pennsylvanian underclays in western Pennsylvania: Jour. Sed. Petrology, v. 38, no. 4, p. 1179-1193, illus., **1968**. The stratigraphic and geographic variations in the clay mineral composition of underclays are largely controlled by the chemistry of the depositional environment.
11. (and Bergenback, Richard Edward, and Weber, John Noel Earl). Relationship between paleotopography and the thickness and geochemistry of a Pennsylvanian fresh water limestone [western Pennsylvania]: Jour. Sed. Petrology, v. 38, no. 2, p. 501-509, illus., **1968**. A paleoslope of 3 degrees can markedly affect the thickness, continuity, and geochemistry of a fresh-water limestone. Differences in the limestones deposited on high and low areas are attributed to sizes and depths of inferred lakes, factors which control the rate of circulation and evaporation.
12. Prediction in geology: Earth and Mineral Sci., v. 39, no. 2, p. 14-15, illus., **1969**. A case is made, from clay deposits in western Pennsylvania, that a knowledge of rock genesis is essential before more accurate predictions of location and quality of mineral deposits can be made. For instance, high-alumina clay occurs where topographic high areas existed at the time of the formation of the clays.

WILLIAMS, KENNETH F.

1. (and George, John R.). Preliminary appraisal of stream sedimentation in the Susquehanna River basin: U. S. Geol. Survey Repts. Open File, 73 p, illus., **1963** [not seen].
2. Sediment discharge of Conestoga Creek at Lancaster [Lancaster County] Pa., from January 1962 to September 1964: U. S. Geol. Survey Repts.

Open File, 34 p., illus. [1968]. About 175 tons per square mile of land is removed by the creek, about 60 percent being discharged during the dormant season and the rest during the growing season. The size distribution of the sediments is described.

WILLINGHAM, C., *see* White, William Blaine, 7.

WILMOTH, BENTON MC MILLAN, JR., *see* Meyer, Gerald, 1.

WILSHUSEN, JOHN PETER.

1. Trough Creek State Park [Blair County]—ice mine and balanced rock: Pennsylvania Geol. Survey, 4th ser. State Park Guide no. 1, 1 sheet, text [1969]. This is a popular account of an ice mine, actually a dug shaft, which is cooled by percolating ground water for an inordinant length of time into the summer, and a large erosional remnant at the crest of a cliff.

WILSON, LEONARD RICHARD.

1. Charles David White [1862-1935]: Oklahoma Geol. Notes, v. 25, no. 9, p. 246, port., 1965.

WILSON STANLEY D.

1. (and Marano, David). Performance of Muddy Run [Lancaster County] embankment: Am. Soc. Civil Engineers Proc., v. 94, paper 6026 (Jour. Soil Mech. and Found. Div., no. SM4), p. 859-881, illus., 1968. The Wissahickon Schist underlies the dam site.

WISE, DONALD UNDERKOFER, *see also* Anderson, T. H., 1; Cloos, Ernst, 1; Freedman, Jacob L., 1; Gray, Carlyle, 2; Newell, Wayne L., 1; Skerlec, Grant M., 1.

1. Chickies Rock [Lancaster County], *in* Some tectonic and structural problems of the Appalachian Piedmont along the Susquehanna River—Field Conf. Pennsylvania Geologists, 25th: Lancaster, Franklin and Marshall College, p. 68-75, illus., 1960. A detailed description of the structural features preserved in this anticline and their interpretation is given in outline form. It is the upper plate of a thrust fault.
2. An introduction to some tectonic and structural problems of the Appalachian Piedmont along the Susquehanna River [Lancaster County], *in* Some tectonic and structural problems of the Appalachian Piedmont along the Susquehanna River—Field Conf. Pennsylvania Geologists, 25th: Lancaster, Franklin and Marshall College, p. 1-9, illus., 1960. This is a general summary of the nature of the problems of the region. Metamorphic rocks, intruded by basic and acidic rocks, are overlain by sedimentary rocks, and all of them have been folded and faulted.
3. Oyster Point Quarry [Lancaster County], *in* Some tectonic and structural problems of the Appalachian Piedmont along the Susquehanna River—Field Conf. Pennsylvania Geologists, 25th: Lancaster, Franklin and Marshall College, p. 64-67, illus., 1960. Internal adjustment during the deformation of the Cambrian Chickies Quartzite is studied. De-

formed *Skolithos* tubes show some of the internal movement. There has been shear movement in the plane of cleavage.

4. The Pequa "silver" mine [Lancaster County], in Some tectonic and structural problems of the Appalachian Piedmont along the Susquehanna River—Field Conf. Pennsylvania Geologists, 25th: Lancaster, Franklin and Marshall College, p. 53-59, illus., 1960. Details of a mineralized zone along a folded thrust fault are given. Argentiferous galena in quartz was mined years ago. Ordovician Conestoga Limestone is in several places imbricated with Cambrian Vintage Dolomite.
5. Rheems Quarry [Lancaster County], in Some tectonic and structural problems of the Appalachian Piedmont along the Susquehanna River—Field Conf. Pennsylvania Geologists, 25th: Lancaster, Franklin and Marshall College, p. 76-83, illus., 1960. A limestone quarry exhibiting differential movement along essentially horizontal planes in the form of plastic deformation is described in great detail. The overall flow pattern has created many smaller features which are demonstrated.
6. (and Kauffman, Marvin Earl). Some tectonic and structural problems of the Appalachian Piedmont along the Susquehanna River [Lancaster County]: Field Conf. Pennsylvania Geologists, 25th Annual Meeting, Guidebook: Lancaster, Franklin and Marshall College, 99 p., illus., 1960. A road log for a 2-day field trip of 56.6 miles also includes descriptions of 12 different stops, all dealing with part of the total story of the region. Each stop is cited separately by author.
7. Williamson's Park [Lancaster County]—late stage shearing and higher order "S" surfaces, in Some tectonic and structural problems of the Appalachian Piedmont along the Susquehanna River—Field Conf. Pennsylvania Geologists, 25th: Lancaster, Franklin and Marshall College, p. 60-63, illus., 1960. Structural features are described in outline form. A spectrum of structural types is preserved, including structures resulting from late stages of deformation. There was strong shearing perpendicular to the fold axes in post-folding time.
8. Rotational mechanisms and measurements in a plunging cleavage fold [Lancaster County] [abs.]: Geol. Soc. America Spec. Paper 76, p. 180, 1964.
9. Previously unreported fracture systems over vast areas of the Appalachians, United States Cordillera, and Europe [abs.]: Am. Geophys. Union Trans., v. 48, no. 1, p. 214-215, 1967.
10. Radar geology and pseudo-geology on an Appalachian Piedmont cross section: Photogram. Engineering, v. 33, no. 7, p. 752-761, illus., 1967. Caution in interpretation is exhorted inasmuch as K-band, side-looking radar imagery shows cultural as well as geological features. Examples are cited from a flight along the Susquehanna River in southeastern Pennsylvania where known geological features are compared with radar photographs; cultural features could be confounded with natural features.
11. (and Grauch, Richard I.). Regional joint pattern superimposed on metamorphic rocks of southeastern Pennsylvania: Pennsylvania Acad. Sci. Proc., v. 40, no. 2, p. 104-110, illus., 1967. The patterns of orientation of the master joint sets and kink planes are remarkably uniform and suggest that the Susquehanna Orocline, whatever its origin, was in

- existence at the time of the formation of the joints and planes. Stresses near the close of the tectonic history of the region are evident.
12. (and Freedman, Jacob L.). Eshelman's Quarry, Landisville [Lancaster County], Pennsylvania, *in* The geology of mineral deposits in south-central Pennsylvania—Field Conf. Pennsylvania Geologists, 33rd: Harrisburg, Pennsylvania Bur. Topog. and Geol. Survey, p. 64-78, illus., **1968**. The quarry is a good place to study the mechanisms by which the major nappe region terminates along its strike. Structures in the quarry are interpreted as edge effects of a greatly thickened nappe region located to the east and north, the quarry being located at the head reentrant. Small folds are overridden by lateral spreading, having been smeared forward along with the transport of the main nappe.
 13. Structural sequence near the type Martic area of [southeastern] Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 101, p. 283, **1968**.
 14. (and Werner, Mathew L.). Tectonic transport domains and the Pennsylvania elbow of the Appalachians [abs.]: EOS, v. 50, no. 4, p. 313, **1969**.

WITWER, DAVID B.

1. Soil facts and planning decisions in Montgomery County, Pennsylvania, *in* Soils and land-use planning: Chicago, Illinois, Am. Soc. Planning Officials, p. 25-38, illus., **1966**. An example of soil mapping in the county with a view toward land-use planning is described, and small-scale maps are included. The use to which the soil maps can be put are cited; most are engineering applications.

WOLF, LANCE, *see* Haller, Robert, 1.

WOLFE, ROBERT T., JR.

1. The correlation of Upper Devonian Chemung sands in west central Pennsylvania, north of Pittsburgh, *in* Symposium on Middle and Upper Devonian stratigraphy of Pennsylvania and adjacent states: Pennsylvania Geol. Survey, 4th ser. Bull. G 39, p. 241-257, illus., **1963**. Many sand bodies from the oil fields are known, and correlations, based upon detailed lithologic and gamma ray logs are made. The second Bradford Sand is the major producing sand and is probably an offshore bar, called the Armstrong.

WOLFSON, DAVID E., *see also* Birge, George W., 1, 2.

1. (and Ortuglio, C.). Carbonizing properties of coals from Fayette, Greene, and Washington counties, Pa.: U. S. Bur. Mines Rept. Invs. 7131, 14 p., illus., **1968**. Proximate and ultimate analyses are included.

WOOD, CHARLES R., *see* Biesecker, J. E., 1; Flippo, Herbert N., Jr., 1; Longwill, Stanley Miller, 2.

WOOD, GEORGE VINCENT.

1. A comparison of three quartzites: PhD Thesis, Pennsylvania State Univ., **1960**; [abs.], Dissert. Abs., v. 21, no. 7, p. 1960, **1961**.

2. Discriminating between refractory and non-refractory quartzite by quantitative petrography: *Jour. Sed. Petrology*, v. 31, no. 4, p. 530-533, illus., **1961**. Silurian Tuscarora Quartzite from Centre, Huntingdon, and Franklin Counties was investigated. Quantitative estimations of quartz, silica cement, FeO percentages, and mean length of quartz grains, when applied in the form of discriminant functions, can differentiate between refractory and non-refractory quartzites.
3. (and Griffiths, John Cedric). Modal analyses of three quartzites and their textural implications: *Jour. Geology*, v. 71, no. 4, p. 405-421, illus., **1963**. Statistical analyses of Tuscarora, Oriskany, and Homewood Quartzites from many places around the state show that the textural arrangement for each detrital component is essentially constant from component to component and from outcrop to outcrop within each formation. Silica cement, however, is independent of the arrangement of the detritus.

WOOD, GORDON HARRY, JR., *see also* Arndt, Harold Harry, 1, 2, 4, 5; Danilchik, Walter, 1; Trexler, John Peter, 2, 3, 4, 7, 8, 9.

1. (and Kehn, Thomas Mathew). Sweet Arrow Fault, east-central Pennsylvania: *Am. Assoc. Petroleum Geologists Bull.*, v. 45, no. 2, p. 256-263, illus., **1961**. The fault is 80 miles long and trends from Swatara Gap in Lebanon County northeastward to New Ringgold in Carbon County at least, and possibly farther. It is a thrust fault which dips 40 to 70 degrees to the southeast and which may have a throw of several thousand feet.
2. (and Trexler, John Peter, and Yelenosky, Andrew, and Soren, Julian). Geology of rocks of Pennsylvanian age in the southern half of the Tremont Quadrangle, Schuylkill County, Pennsylvania: *U. S. Geol. Survey Bull.* 1112 F, p. F181-F208, illus. incl. geol. map, **1962**. A description of Pennsylvanian rocks and a discussion of the stratigraphy, the anthracite beds, and structural features of a part of the Southern Anthracite Field are given.
3. (and Trexler, John Peter, and Arndt, Harold Harry). Pennsylvanian rocks of the southern part of the Anthracite Region of [north] eastern Pennsylvania, in *Geological Survey research 1962*; *U. S. Geol. Survey Prof. Paper* 450 C, p. C39-C42, illus., **1962**. The Mississippian-Pennsylvanian boundary falls within the Mauch Chunk Formation. This is overlain by Lower and Middle Pennsylvanian Pottsville Formation, and this is overlain by the Upper Pennsylvanian Llewellyn Formation. All are clastic rocks.
4. (and others). Geology of the southern part of the Pennsylvania Anthracite Region—Field trip no. 4, Annual Meeting, Nov. 1963: New York, Geol. Soc. America, 83 p., illus. geol. map, **1963**. A two-day field trip examining stratigraphy, coal geology, and structural geology of Devonian to Pennsylvanian rocks is outlined. The first day is 118 miles long, from Harrisburg to Pottsville via Shamokin, and makes 6 stops. The second day is from Pottsville to Schuylkill Haven via Minersville, Schuylkill County and is 38 miles long. It makes 7 stops. Extensive descriptions of the geology *en route* are included.
5. Structural setting and history, in *Geology of the southern part of the [northeastern] Pennsylvania Anthracite Region—Field Trip no. 4, Annual*

- Meeting, Nov. 1963: New York, Geol. Soc. America, p. 13-17, illus., **1963**. A cursory description of the tight folds and faults of the region is given preliminary to a 2-day field trip. The anthracite occurs in synclinal troughs in complexly folded synclinoria.
6. (and Trexler, John Peter, and Kehn, Thomas Mathew, and Soren, Julian, and Yelenosky, Andrew). Geologic maps of the west-central part of the Southern Anthracite Field [northeastern] Pennsylvania: U. S. Geol. Survey Repts. Open File, 10 sheets, scale, 1:10,000, **1965** [not seen].
 7. (and Trexler, John Peter, and Yelenosky, Andrew). Geologic map [and sections] of the Minersville Quadrangle, Schuylkill County, Pennsylvania: U. S. Geol. Survey Geol. Quad. Maps of the U. S., Map GQ 690, scale, 1:24,000, **1968**. Devonian-Pennsylvanian, and Quaternary rocks are mapped. Close folding is the dominant structure.
 8. (and Kehn, Thomas Mathew). Geologic map [and sections] of the Pine Grove Quadrangle, Schuylkill, Lebanon, and Berks Counties, Pennsylvania: U. S. Geol. Survey Geol. Quad. Maps of the U. S., Map GQ 691, scale, 1:24,000, **1968**. Ordovician-Pennsylvanian and Quaternary units are present, as are tightly folded anticlines and synclines.
 9. (and Kehn, Thomas Mathew). Geologic map [and sections] of the Swatara Hill Quadrangle [Berks and Schuylkill Counties], Pennsylvania: U. S. Geol. Survey Geol. Quad. Maps of the U. S., Map GQ 689, scale, 1:24,000, **1968**. Ordovician to Pennsylvanian, and Quaternary units are present. Folds are the major structures.
 10. Geologic map [and sections] of the Tower City Quadrangle, Schuylkill, Dauphin, and Lebanon Counties, Pennsylvania: U. S. Geol. Survey Geol. Quad. Maps of the U. S., Map GQ 698, scale, 1:24,000, **1968**. Silurian to Pennsylvanian, and Quaternary units are present. Folding is very pronounced.
 11. (and Trexler, John Peter). Geologic map [and sections] of the Tremont Quadrangle, Schuylkill and Northumberland Counties, Pennsylvania: U. S. Geol. Survey Geol. Quad. Maps of the U. S., Map GQ 692, scale, 1:24,000, **1968**. Silurian to Pennsylvanian and Quaternary rocks are present. Folds are the dominant structure.
 12. (and Trexler, John Peter). Geologic map [and sections] of anthracite-bearing rocks in the west-central part of the Southern Anthracite Field [Dauphin, Lebanon, and Schuylkill Counties], Pennsylvania, western area: U. S. Geol. Survey Misc. Geol. Invs. Map I-529; . . . eastern area . . . Map 528, scale, 1:12,000, 4 sheets, **1968**. Only Pennsylvanian rocks are mapped; the coal beds are included.
 13. (and Arndt, Harold Harry). Geologic map [and sections] of the Shenandoah Quadrangle, Schuylkill County, Pennsylvania: U. S. Geol. Survey Geol. Quad. Maps of the U. S., Map GQ 781, scale, 1:24,000, **1969**. Mississippian-Pennsylvanian, and Quaternary material is mapped. Folds are very pronounced.
 14. (and Trexler, John Peter, and Kehn, Thomas Mathew). Geology of the west-central part of the Southern Anthracite Field and adjoining areas, Pennsylvania: U. S. Geol. Survey Prof. Paper 602, 143 p., illus., **1969**. A complete geological description of the area is given. Rocks from Ordovician to Pennsylvanian, and Quaternary age are mapped and discussed.

Folds and faults are the common structures. Coal is the chief mineral resource, although sand and gravel, road metal, and building stone is also abundant. Numerous small-scale maps are included.

15. (and Arndt, Harold Harry, and Carter, M. Devereux). Systematic jointing in the western part of the Anthracite Region of [north] eastern Pennsylvania: U. S. Geol. Survey Bull. 1271-D, p. D1-D17, illus., **1969**. A conjugate joint system of strike and dip sets occurs in Silurian to Pennsylvanian aged rocks and is nearly perpendicular to the structural grain of the region. It was formed before and during the early stages of folding of the Appalachian Orogeny.

WOOD, PERRY ROWLEY.

1. (and Johnston, Herbert E.). Hydrology of the New Oxford Formation in Adams and York Counties, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. W 21, 66 p., illus. incl. geol. map, **1964**. The Triassic rocks are in a belt 3-5 miles wide and trend in a northeasterly direction. The water-bearing properties of each unit are discussed. Water comes primarily from the regolith and the bedrock. Analyses are included.

WOODHOUSE, JAMES, 1770-1809.

1. Experiments and observations on the Lehigh coal [Northampton County]: Philadelphia Medical Museum, v. 1, p. 441-444, 449-450, **1805**. A description of anthracite coal is given. Its role as a fuel is suggested as a competitor with the Triassic coal of the James River area in Virginia.
2. An account of the Perkiomen zinc mine [Chester County] with an analysis of the ore: Philadelphia Medical Museum, v. 5, no. 1, p. 133-135, **1808**; discussion by Adam Seybert with title, Facts to prove that blende, or sulphuret of zinc, may be worked to advantage in the United States: no. 4, p. 209-216, **1808**; reply by author, v. 6, no. 1, p. 44-54, **1809**. Zinc ore from the Perkiomen Creek area is described and analyzed. Seybert says it can be smelted and Woodhouse says it cannot.

WOODROW, DONALD LAWRENCE, *see also* Fletcher, Frank William, 4.

1. Post-Rhinestreet stratigraphy in the Sayre and Towanda Quadrangles [Bradford County], Pennsylvania, in Symposium on Middle and Upper Devonian stratigraphy of Pennsylvania and adjacent states: Pennsylvania Geol. Survey, 4th ser. Bull. G 39, p. 79-85, illus., **1963**. Five formations and two members are recognized and described. They are, in ascending order: Gardeau Formation (Corning Member at the top), Formation A, Formation B (including Member B-1 at the base), and Formations C and D.
2. Tectonics and sedimentation [Devonian] in the northern Appalachian Plateau [Bradford County] Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 82, p. 229-230, **1965**.
3. Upper Devonian stratigraphy and sedimentation in Bradford County, Pennsylvania: PhD Thesis, niv. Rochester, **1965**; [abs.], Dissert. Abs., v. 26, no. 6, p. 3253, **1965**.
4. Cyclic sedimentation in the Upper Devonian of the northern Appalachian Plateau [northern Pennsylvania] [abs.]: Geol. Soc. America Spec. Paper 87, p. 188, **1966**.

5. (and Fletcher, Frank William). Late Devonian paleogeography in southeastern New York and northeastern Pennsylvania, in *Internatl. Symposium on the Devonian System*, v. 2: Calgary, Alberta Soc. Petroleum Geologists, p. 1327-1334, illus., **1967**. Four zones are recognized in the area which are: an upland alluvial plain, a lowland alluvial plain, a littoral-paludal, and a marine zone. The zones are geographically arranged by the shifting shoreline.
6. Stratigraphy, structure, and sedimentary patterns in the Upper Devonian of Bradford County, Pennsylvania: Pennsylvania Geol. Survey, 4th ser. Bull. G 54, 78 p., illus. incl. geol. map, **1968**. Twelve formations are identified, and all but two are traced from the New York standard section. A monocline is the predominant structure, with three asymmetrical anticlines imposed upon it. Tectonically controlled sedimentation has resulted in facies changes which are described.
7. Upper Devonian sedimentation in northeastern Pennsylvania [abs.]: Geol. Soc. America Spec. Paper 101, p. 284, **1968**.
8. (and Fletcher, Frank William). Devonian dipnoan aestivation cylinders [northeastern Pennsylvania] [abs.]: Geol. Soc. America Spec. Paper 121, p. 383, **1969**.

WOODS, KENNETH BRADY.

1. Some highway problems of the United States correlated with physiographic provinces, in *Proceedings of the 18th annual highway geology symposium*, 1967: Purdue Univ. Engineering Bull. 51, no. 4, p. 1-16, illus., **1967**. The nature of the rocks in the various provinces influence the nature of highway problems, and Pennsylvania is no exception; no specific examples are cited, however.

WOODWARD, HERBERT PRESTON, *see also* Dennison, John Manley, 2; Drake, Charles Lum, 1.

1. Multiple folding in the Appalachian Basin: *World Oil*, v. 145, no. 7, p. 110-113, illus., **1957**. At least three trends of folding in Pennsylvania can be detected. One is attributed to Taconic folding in Ordovician time, another to Acadian folding in the Devonian, and another to the Appalachian Revolution of the Late Paleozoic.
2. The Appalachian oil and gas province in 1961 [abs.]: *Am. Petroleum Inst. Proc.* 1961, v. 41, sec. 4, p. 19-20, **1961**.
3. Preliminary subsurface study of southeastern Appalachian interior plateau: *Am. Assoc. Petroleum Geologists Bull.*, v. 45, no. 10, p. 1634-1655, illus., **1961**. Many data from western Pennsylvania are included in a study of the Cambrian and Ordovician. Isopachous maps for each of the series are included. A pronounced thickening of the Lower Cambrian rocks to the southeast of a northeast-trending line in southwestern Pennsylvania is evident; the line is called the steep continental face and may be a fault.
4. Reappraisal of Appalachian geology: *Am. Assoc. Petroleum Geologists Bull.*, v. 45, no. 10, p. 1625-1633, **1961**. The Appalachians, which include Pennsylvania, have been studied for a long time and should be thoroughly understood; it is not so, and numerous problems are cited, some of which are in the state.

5. Upper Devonian stratigraphy and structure in northeastern Pennsylvania, *in* Symposium on Middle and Upper Devonian stratigraphy of Pennsylvania and adjacent states: Pennsylvania Geol. Survey, 4th ser. Bull. G 39, p. 279-301, illus., **1963**. Faulting during the Devonian is suggested to explain the otherwise strange stratigraphic problems. A major disconformity within the Catskill Formation is suggested also, as a result of the faulting, or "Acadian" effect. The Cornwall-Kelvin displacement is a part of the example.
6. Central Appalachian tectonics and the deep basin: Am. Assoc. Petroleum Geologists Bull., v. 48, no. 3, p. 338-356, illus., **1964**. The Appalachians are deformed symmetrically from a line from Baltimore to and along the Nittany Arch. The nature of the deformation requires a reevaluation of deeper Appalachian Basin structures.
7. Cornwall displacement [southeastern Pennsylvania], an Appalachian basinal dislocation [abs.]: Geol. Soc. America Spec. Paper 76, p. 181, **1964**.
8. Morris Roncs (1922-1965): Am. Assoc. Petroleum Geologists Bull., v. 50, no. 2, p. 401-403, port., **1966**.

WOOLLARD, GEORGE PRIOR.

1. Regional isostatic relations in the United States, *in* The earth beneath the continent: Am. Geophys. Union Mon. 10, p. 557-594, illus., **1966**. Isostatic gravity anomaly profiles across the United States include Pennsylvania. The Appalachians, in general, are marked by negative anomalies. A small-scale isostatic anomaly map of the United States is included.
2. A catalog of earthquakes in the United States prior to 1925 . . . : Hawaii Inst. Geophysics Data Rept. 10, unpagcd, **1968**. Many earthquakes with epicenters in Pennsylvania are included. Places, dates, times, intensity, and remarks are the column headings of the tables.

WORTHINGTON, HELEN WEISSENBOEN, *see* Chidester, Andrew Herman, 2.

WRIGHT, LAUREN ALBERT, *see* Chidester, Andrew Herman, 3.

WRIGHT, WILNA B., *see* Carr, Martha Ensign Strait, 1.

WYLLIE, PETER JOHN, *see* Davidson, Anthony, 1, 2.

WYRICK, GRANVILLE GLENN.

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- Cedar Hill area, guidebook: Lapham, D. M., 6
- Cedar Hill serpentine quarry: Lapham, D. M., 1, 7
- Lancaster County: Bridgens, H. F., 1
- Piedmont, guidebook: Wise, D. U., 6
- Womelsdorf Quad.: Geyer, A. R., 1

Economic geology

- brucite: Gildersleeve, B., 1
- chromite: Pearre, N. C., 1; Sampson, E., 1, 2; Thayer, T. P., 1
- alluvial: Dunn, P. A., 1
- copper: Kinkel, A. R., Jr., 1
- magnesite: Gildersleeve, B., 1
- mineral resources, Womelsdorf Quad.: Geyer, A. R., 1
- nickel, Gap Mine: Cornwall, H. R., 1
- serpentine, State Line deposits: McKague, H. L., 1, 2

Geochemistry

- Ca-Mg ratios, carbonate rocks, Lancaster Quad.: Meisler, H. 6
- chromite, chromium isotopes: Flesch, G. D., 1

Geomorphology

- Conestoga Creek, valley sediments: Werner, M. L., 1
- Fertility Cave: Ibberson, D., 1
- Mount Joy Cave no. 1: McGill, D., 2
- Mount Joy Caves nos. 2, 3, 4: Reiche, J. R., Jr., 1
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Geophysical investigations

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- Columbia East Quad.: Socolow, A. A., 7
- Downingtown Quad.: Socolow, A. A., 3
- Ephrata Quad.: Socolow, A. A., 7
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- Lancaster Quad.: Socolow, A. A., 7
- Lebanon Quad.: Socolow, A. A., 7
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- Manheim Quad.: Socolow, A. A., 7
- New Holland Quad.: Socolow, A. A., 7
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- radar, Susquehanna River area: Wise, D. U., 10

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- eastern, metamorphic rocks: Poth, C. W., 5
- Lancaster Quad., carbonate rocks: Meisler, H., 5, 6
- Triassic, New Oxford Formation: Johnston, H. E., 1
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- Columbia East Quad.: Bromery, R. W., 36
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- Bamford area: Freedman, J. L., 4
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- southern: Lapham, D. M., 11
- Triassic, New Oxford Formation: Johnston, H. E., 1
- Womelsdorf Quad.: Geyer, A. R., 1

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- eastern, metamorphic rocks: Poth, C. W., 5
- Lancaster Quad., carbonate rocks: Meisler, H., 5
- Triassic, New Oxford Formation: Johnston, H. E., 1
- lithofacies, Wissahickon Schist: Southwick, D. L., 1

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- brucite, Cedar Hill quarry: Lapham, D. M., 13
- deweyllite, Cedar Hill quarry: Lapham, D. M., 3
- genthite, Wood mine: Faust, G. T., 1

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- echinoderm, Cambrian, Kinzers Formation: Durham, J. W., 1
- Reptilia, Triassic
 - Blue Bell, popular: Colbert, E. H., 2
 - Brunswick Formation: Colbert, E. H., 3
- Trilobita, Cambrian, Kinzers Formation: Rasetti, F. R. D., 2

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- Cedar Hill serpentine quarry: Lapham, D. M., 1
- Mine Ridge ultramafic rocks: Villaume, J. F., 1
- Muddy Run, Wissahickon Schist: Wilson, S. D., 1
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Sedimentary petrology

- Conestoga Creek, sediments: Williams, K. F., 2
- Manheim, floodplain sediments: Cadwell, D. H., 1

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- Cambrian-Ordovician
 - Conestoga Limestone: Rodgers, J., 4
 - Lancaster Quad.: Miesler, H., 7
- Precambrian-Cambrian, Womelsdorf Quad.: Geyer, A. R., 1
- Precambrian-Ordovician: Poth, C. W., 5
 - Susquehanna River area: Kauffman, M. E., 1
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 - Susquehanna River area: Kauffman, M. E., 1
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- Chickies Creek area: Henderson, J. R., Jr., 1
- Chickies Rock: Wise, D. U., 1
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- Conococheague Formation, minor structures: Henderson, J. R., Jr., 3
- Donegal Springs tectonic breccia: Sherlec, G. M., 1
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- York County: Lapham, D. M., 9

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- Neshannock Quad., guidebook: Carswell, L. D., 2

Economic geology

- coal, bituminous, reserves: Van Lieu, J. A., 1

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- Mercer Quad.: Poth, C. W., 2, 4
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- pteridophytes, Washington Shale: Cross, A. T., 2

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- Devonian-Pennsylvanian, Neshannock Quad.: Carswell, L. D., 1
- Mississippian: Ferm, J. C., 8
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- Mercer Quad.: Poth, C. W., 2
- Pennsylvanian: Carswell, L. D., 2; Ferm, J. C., 8
- Pleistocene, Mercer Quad.: Poth, C. W., 2

LEAD, *see also* lead-bearing minerals, and Mineral resources

- Chester County: McKnight, E. T., 1

LEBANON COUNTY, *see also* Pennsylvania, and Pennsylvania-Southeastern

Absolute age

- Triassic, Cornwall deposit: Fanale, F. P., 1, 2, 3

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- Cornwall area: Gray, C., 3
- Lebanon area, guidebook: Lapham, D. M., 5, 6
- Lykens Quad.: Trexler, J. P., 5, 6, 8
- Pine Grove Quad.: Wood, G. H., Jr., 8
- southern, guidebook: Wise, D. U., 6
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- Womelsdorf Quad.: Geyer, A. R., 1

Economic geology

- beryllium: Griffiths, W. R., 1
- copper: Kinkel, A. R., Jr., 1
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- iron, Cornwall area: Gray, C., 3; Lapham, D. M., 2, 16
- limestone: Sims, S. J., 2
- mineral resources, Womelsdorf Quad.: Geyer, A. R., 1
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- subsidence, Hershey area: Foose, R. M., 1, 2

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- Cornwall area: Popovich, D. E., 1
- helium: Fanale, F. P., 4
- sulfur isotopes: Ault, W. U., 1

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- Casino Cave: Hauer, P. M., 2
- Hershey-Coy Cave: Haller, R., 1; Hivner, B., 7
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- Lebanon Quad.: Socolow, A. A., 7
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- Hershey area, engineering problems: Foose, R. M., 1, 2
- Lancaster Quad., carbonate rocks: Meisler, H., 5
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 - Lebanon Quad.: Bromery, R. W., 44
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 - Pine Grove Quad.: Wood, G. H., Jr., 8
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 - Womelsdorf Quad.: Geyer, A. R., 1

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- Lancaster Quad., carbonate rocks: Meisler, H., 5
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Mineralogy

- magnetite: Newhouse, W. H., 1
- pyrite, sulfur content, Cornwall: Lenker, E. S., 1

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- Ordovician, volcanic rocks: Bricker, O. P., Jr., 1; Jaron, M. G., 1

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- Cambrian-Ordovician, Cornwall area: Gray, C., 3
- Pennsylvanian, Lykens Quad.: Trexler, J. P., 5, 6, 8
- Precambrian-Ordovician, Womelsdorf Quad.: Geyer, A. R., 1
- Quaternary
 - Pine Grove Quad.: Wood, G. H., Jr., 8
 - Tower City Quad.: Wood, G. H., Jr., 10
- Silurian-Devonian, Pine Grove Quad.: Wood, G. H., Jr., 8
- Silurian-Pennsylvanian, Tower City Quad.: Wood, G. H., Jr., 10
- Triassic, Cornwall area: Gray, C., 3

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- folding
 - Pine Grove Quad.: Wood, G. H., Jr., 8
 - Tower City Quad.: Wood, G. H., Jr., 10
- nappes, Annville quarry: Gray, C., 2

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- Easton area, guidebook: Lapham, D. M., 5
- Lehigh Valley and Reading Hills, guidebook: Ryan, J. D., 2

Earthquakes

- 1961: Lander, J. F., 1

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- talc: Clidester, A. H., 2
- thorium: Olson, J. C., 1
- zinc, Friedensville: Callahan, W. H., 2; Hoagland, A. D., 1
- paleophysiographic controls: Callahan, W. H., 1

Geobotanical investigations

- Friedensville, plants and zinc: Cannon, H. L., 1

Geochemistry

- Friedensville, sulfur isotopes: Ault, W. U., 2

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- Guthville Cave: Krall, D., 1
- Lehigh Valley and Reading Hills: Whitcomb, L., 1

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- magnetic, Allentown Quad.: Bromery, R. W., 60
- seismic, quarry blasting: Ewing, W. M., 1, 2

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- carbonate rocks: Flippo, H. N., Jr., 1
- Ordovician, Martinsburg Formation: Poth, C. W., 6

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- Lehigh quarry: Broughton, P., 1

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- Brachiopoda, Ordovician, Schochary Ridge Sandstone: Bretsky, P. W., Jr., 3
- Devonian, Ludlowville Formation fauna: Richards, H. G., 3

Petrology

- serpentine: Montgomery, A., 1

Sedimentary petrology

- Silurian, Clinton Formation, sedimentation: Smith, N. D., 1

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- Ordovician, Jacksonburg Formation: Sherwood, W. C., 1, 2
- Precambrian-Triassic, Lehigh Valley: Mackenzie, F. T., 1

Structural geology

- Great Valley and Reading Prong: Ryan, J. D., 1
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 - Jacksonburg Formation: Sherwood, W. C., 1, 2
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- Franklin County, Cretaceous, geomorphologic significance: Pierce, K. L., 2

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- Adams County, Hanover quarry: Hole, G. L., 1
- Bedford County, Evitts Creek Quad.: deWitt, W., Jr., 1
- Blair County, Ordovician-Silurian: Thompson, R. R., 1

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Lancaster County, Womelsdorf Quad.: Geyer, A. R., 1

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- Cedar Run Quad.: Colton, G. W., 2
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- mineral resources, Cedar Run Quad.: Colton, G. W., 2
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- Slate Run Quad.: Colton, G. W., 4
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- Carpenter's Spring Cave: Hoover, H., 1
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- glacial geology: Denny, C. S., 2
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- structure, western: Colton, G. W., 5
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- Cedar Run Quad.: Colton, G. W., 2
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- Bald Eagle: Horback, H., 1

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- Pelecypoda, Devonian, Chemung Formation: Conrad, T. A., 1

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- Montoursville Gravel, sedimentary analysis: Griffiths, J. C., 7

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- Devonian: Colton, G. W., 3
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- Lancaster County: Gildersleeve, B., 1

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- Pennsylvania, coal, magnetic properties: Bivins, D., 1

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- Bucks County, Triassic structures: Zietz, I., 1
- Chester County, northern, Triassic basin: Crowe, C., 1; Shank, J. C., 1
- Clearfield County, depth to basement: Griscorn, A., 2

- Columbia County, Silurian, paleomagnetism: Irving, E., 2

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- Pennsylvania-Central, Mississippian, paleomagnetism: Knowles, R. R., 3

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- influence of diffusion on magnetic properties: Beck, M. E., Jr., 3
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- Pennsylvania-Southwestern, crustal study: Zietz, I., 2, 3

- Pennsylvania-Western, geological interpretation: Beck, M. E., Jr., 1

- York County, Dillsburg area: Coleman, K. F., 1

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- Lebanon County: Newhouse, W. H., 1
- Pennsylvania-Southeastern, zoned: Davidson, A., 1

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- Ledford County, New Paris Sink

- fauna: Guilday, J. E., 10
- squirrels: Guilday, J. E., 6
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- Blair County, Frankstown Cave, bears: Kurten, B., 1

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- Centre County, Hosterman's Pit Cave, fauna: Guilday, J. E., 13; Landis, C., Jr., 1

- Montgomery County, Port Kennedy Cave, bears: Kurten, B., 1

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- York County, Bootlegger Sink: Guilday, J. E., 12

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- Mercer County, Pymatuning Creek, deer: Guilday, J. E., 7

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- Pennsylvania-Southeastern: Crittenden, M. D., Jr., 1

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- Stockton Quad.: Boynton, G. R., 1
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Pennsylvania-Southwestern, Pittsburgh area: Bates, R. G., 1, 2

Biofaeies

Pennsylvania-Western, Pennsylvanian, Hamden Shale: Williams, E. G., 6

Economic

Armstrong County

natural gas: Lytle, W. S., 6
 petroleum and natural gas, Foxburg Quad.: Bergsten, J. M., 1

Beaver County, coal, bituminous: Patterson, E. D., 3

Butler County

coal, bituminous: Patterson, E. D., 4
 petroleum and natural gas, Foxburg Quad.: Bergsten, J. M., 1

Centre County, Mercer Clay: Pa. Geol. Survey, 5

Chester County

chromite: Pearre, N. C., 1
 graphite: Cameron, E. N., 1
 mineral resources: Chester County Planning Commission, 1

Clarion County, petroleum and natural gas, Foxburg Quad.: Bergsten, J. M., 1

Clearfield County

Clarion Coal, Houtzdale Quad.: Edmunds, W. E., 2
 clay, Houtzdale Quad., northern: Edmunds, W. E., 2

coal, bituminous, Houtzdale Quad., northern: Edmunds, W. E., 2
 Lower Freeport Coal: Edmunds, W. E., 2
 Lower Kittanning Coal: Edmunds, W. E., 2
 Middle Kittanning Coal: Edmunds, W. E., 2
 minor coals: Edmunds, W. E., 2
 Upper Freeport Coal: Edmunds, W. E., 2
 Mereer Clay: Pa. Geol. Survey, 5
 Clinton County, Mercer Clay: Pa. Geol. Survey, 5
 Cumberland County, clay, Mount Holly Springs Quad.: Freedman, J. L., 2
 Fayette County, Donegal Quad.
 Brookville Coal: Shaffner, M. N., 1
 Lower Kittanning Coal: Shaffner, M. N., 1
 Jefferson County, natural gas, Elk Run field: Heyman, L., 1
 Lancaster County, chromite: Pearre, N. C., 1
 Lawrence County, coal, bituminous: Van Lieu, J. A., 1
 Northumberland County, coal, anthracite, Shamokin Quad.: Danilehik, W., 1
 Pennsylvania
 clay and shale: Deasy, G. F., 5
 coal: Pa. Geol. Survey, 1; Trumbull, J. V. A., 1
 deep oil and gas sands: Lytle, W. S., 6
 limestones: O'Neill, B. J., Jr., 1
 limestones and dolomites: Deasy, G. F., 4; Pa. Geol. Survey, 8
 petroleum: Kelly, G. F., 1
 petroleum and natural gas fields: Lytle, W. S., 12; Pa. Geol. Survey, 1; Vlissides, S. D., 1
 salt: Pierce, W. G., 1
 silica: Murphy, T. D., 1
 uranium: Klemic, H., 1
 Somerset County, coal, bituminous Donegal Quad.
 Brookville Coal: Shaffner, M. N., 1
 Lower Kittanning Coal: Shaffner, M. N., 1
 southern: Flint, N. K., 3
 Venango County, petroleum and natural gas, Foxburg Quad.: Bergsten, J. M., 1
 Warren County, petroleum and natural gas fields
 Youngsville Quad. area: McGlade, W. G., 1
 Warren Quad.: Lytle, W. S., 9, 16

Washington County
 oil wells, Washington City: McGlade, W. G., 3
 petroleum and natural gas fields, Amity Quad.: McGlade, W. G., 3
 Westmoreland County
 Donegal Quad.
 Brookville Coal: Shaffner, M. N., 1
 Lower Kittanning Coal: Shaffner, M. N., 1
 natural gas: Lytle, W. S., 6

Engineering geology

Pennsylvania, gas storage pools: Lytle, W. S., 10

Geochemical

Lancaster County
 Bamford area
 copper: Freedman, J. L., 4
 lead: Freedman, J. L., 4
 zinc: Freedman, J. L., 4
 Gap area
 zinc: Freedman, J. L., 4
 Pequea area
 lead: Freedman, J. L., 4
 zinc: Freedman, J. L., 4
 Pennsylvania-Southeastern, trace elements: Keith, M. L., 2
 Pennsylvania-Western, Devonian, carbonohydrates: Swain, F. M., Jr., 5

Geologic

Adams County
 Caledonia Park area: Fauth, J. L., 2
 Triassic, New Oxford Formation: Wood, P. R., 1
 Allegheny County, Monongahela Quad.: Roen, J. B., 1
 Beaver County: Patterson, E. D., 3
 Bedford County
 Everett Quad.: Knowles, R. R., 2
 Evitts Creek Quad.: deWitt, W., Jr., 1
 Berks County
 Lebanon Valley: Meisler, H., 4
 Pine Grove Quad.: Wood, G. H., Jr., 8
 Reading Quad., Precambrian rocks: Buekwalter, T. V., Jr., 2
 Swatara Hill Quad.: Wood, G. H., Jr., 9
 Triassic, Brunswick Formation: Longwill, S. M., 2
 Womelsdorf Quad.: Geyer, A. R., 1
 Bradford County: Denny, C. S., 2
 northern: Woodrow, D. L., 6
 Bucks County
 Bristol Quad.: Owens, J. P., 1
 Frenehstown Quad.: Drake, A. A., Jr., 2

- New Hope area, Triassic: McCauley, J. F., 1
 Riegelsville Quad.: Drake, A. A., Jr., 6
 Trenton East Quad.: Owens, J. P., 2
 Butler County: Patterson, E. D., 2, 4
 Mercer Quad.: Poth, C. W., 2
 Carbon County, Lehighton Quad., southern: Klemie, H., 2
 Centre County, Allensville Quad., northern: Flueckinger, L. A., 1
 Chester County: Chester County Planning Comm., 1
 Franklin and Just graphite mines: Cameron, E. N., 1
 metamorphic rocks: Poth, C. W., 5
 southern: Lapham, D. M., 11
 Clearfield County, Houtzdale Quad., northern: Edmunds, W. E., 2
 Clinton County, Slate Run Quad.: Colton, G. W., 4
 Cumberland County
 Caledonia Park area: Fauth, J. L., 2
 Loysville Quad.: Miller, J. T., 1
 New Bloomfield Quad., southern: Dyson, J. L., 2
 Dauphin County
 Cambrian-Ordovician carbonate rocks: MacLachlan, D. B., 2, 3
 Klingerstown Quad.: Trexler, J. P., 5, 6, 7
 Lykens Quad.: Trexler, J. P., 5, 6, 8
 New Bloomfield Quad., northern: Dyson, J. L., 1
 New Bloomfield Quad., southern: Dyson, J. L., 2
 Ordovician, Martinsburg Formation: Carswell, L. D., 3
 Tower City Quad.: Wood, G. H., Jr., 10
 Fayette County
 California Quad.: Schweinfurth, S. P., 1
 Donegal Quad.: Shaffner, M. N., 1
 Mather Quad.: Kent, B. H., 5
 Morgantown North Quad.: Simms, F. E., 1
 Franklin County
 Caledonia Park area: Fauth, J. L., 2
 McConnellsburg Quad.: Pierce, K. L., 1
 southeastern: Root, S. I., 2
 Fulton County, McConnellsburg Quad.: Pierce, K. L., 1
 Greene County
 Amity Quad.: Berryhill, H. L., Jr., 2
 Carmichaels Quad.: Berryhill, H. L., Jr., 4
 Mather Quad.: Kent, B. H., 5
 Morgantown North Quad.: Simms, F. E., 1
 Huntingdon County, Allensville Quad.: Flueckinger, L. A., 1
 Juniata County
 Loysville Quad.: Miller, J. T., 1
 Millintown Quad.: Conlin, R. R., 1
 Lackawanna County, Ransom Quad.: Kehn, T. M., 2
 Lancaster County
 metamorphic rocks: Poth, C. W., 5
 southern: Lapham, D. M., 11
 Triassic, New Oxford Formation: Johnston, H. E., 1
 Womelsdorf Quad.: Geyer, A. R., 1
 Lawrence County: Van Lieu, J. A., 1
 Mercer Quad.: Poth, C. W., 2
 Neshannock Quad.: Carswell, L. D., 1
 Lebanon County
 Cornwall area: Gray, C., 3
 Lebanon Valley: Meisler, H., 4
 Lykens Quad.: Trexler, J. P., 5, 6, 8
 Pine Grove Quad.: Wood, G. H., Jr., 8
 Tower City Quad.: Wood, G. H., Jr., 10
 Womelsdorf Quad.: Geyer, A. R., 1
 Lehigh County, Ordovician, Jacksonburg Formation: Sherwood, W. C., 1, 2
 Luzerne County, Ransom Quad.: Kehn, T. M., 2
 Lycoming County: Denny, C. S., 2
 Cedar Run Quad.: Colton, G. W., 2
 Slate Run Quad.: Colton, G. W., 4
 Waterville Quad.: Colton, G. W., 6
 Mercer County
 Mercer Quad.: Poth, C. W., 2
 Neshannock Quad.: Carswell, L. D., 1
 Mifflin County, Mifflintown Quad.: Conlin, R. R., 1
 Monroe County, Stroudsburg Quad., surficial: Epstein, J. B., 6
 Montgomery County, Triassic Brunswick Formation: Longwill, S. M., 2
 Stockton Formation: Rima, D. R., 2
 Northampton County
 Bangor Quad.: Davis, R. E., 1
 Belvidere Quad.: Drake, A. A., Jr., 9
 Easton Quad.: Drake, A. A., Jr., 5
 Ordovician, Jacksonburg Formation: Sherwood, W. C., 1, 2
 Portland Quad.: Drake, A. A., Jr., 9
 Stroudsburg Quad., surficial: Epstein, J. B., 6
 Northumberland County
 Klingerstown Quad.: Trexler, J. P., 5, 6, 7
 Tremont Quad.: Wood, G. H., Jr., 11
 Valley View Quad.: Trexler, J. P., 5, 6, 9

- Pennsylvania: Gray, C., 1; North American Geological Map Committee, 1; Osborn, F. F., 1; Pa. Geol. Survey, 4; Stose, G. W., 1
Appalaehian Mountains: U. S. Geol. Survey, 6
basement: Bayley, R. W., 1
- Pennsylvania-Eastern
Delaware River Valley: Hely, A. G., 1
pre-Cretaceous rocks: Olmsted, F. H., 1
- Pennsylvania-Northeastern
Quaternary sediments: Olmsted, F. H., 1
Schuylkill River Basin: Biesecker, J. E., 1
Southern Anthracite Field: Wood, G. H., Jr., 4
western: Wood, G. H., Jr., 6, 12
west-central: Wood, G. H., Jr., 14
- Pennsylvania-Northwestern, glacial geology: Shepps, V. C., 1
- Pennsylvania-Southeastern
Coastal Plain and Piedmont: Biesecker, J. E., 1
compared with aeromagnetic maps: Bromery, R. W., 61
Cretaceous-Tertiary rocks: Olmsted, F. H., 1
Quaternary sediments: Olmsted, F. H., 1
Reading Prong: Biesecker, J. E., 1
Swatara Creek Basin: Stuart, W. T., 3
Triassic: Biesecker, J. E., 1; Van Houten, F. B., 3
ultramafic bodies: Larrabee, D. M., 1
- Pennsylvania-Southwestern, compared with aeroradioactivity maps: Bates, R. G., 1, 2
- Perry County
Loysville Quad.: Miller, J. T., 1
Mifflintown Quad.: Conlin, R. R., 1
New Bloomfield Quad., northern: Dyson, J. L., 1
New Bloomfield Quad., southern: Dyson, J. L., 2
- Potter County, Slate Run Quad.: Colton, G. W., 4
- Schuylkill County
Klingerstown Quad.: Trexler, J. P., 5, 6, 7
Lykens Quad.: Trexler, J. P., 5, 6, 8
Minersville Quad.: Wood, G. H., Jr., 7
Pine Grove Quad.: Wood, G. H., Jr., 8
Shenandoah Quad.: Wood, G. H., Jr., 13
- Swatara Hill Quad.: Wood, G. H., Jr., 9
Tower City Quad.: Wood, G. H., Jr., 10
Tremont Quad.: Wood, G. H., Jr., 11
southern: Wood, G. H., Jr., 2
Valley View Quad.: Trexler, J. P., 5, 6, 9
- Snyder County, Mifflintown Quad.: Conlin, R. R., 1
- Somerset County
Donegal Quad.: Shaffner, M. N., 1
southern: Flint, N. K., 3
- Sullivan County: Denny, C. S., 2
- Tioga County: Denny, C. S., 2
Cedar Run Quad.: Colton, G. W., 2
- Washington County
Amity Quad.: Berryhill, H. L., Jr., 2
California Quad.: Schweinfurth, S. P., 1
Carmichaels Quad.: Kent, B. H., 4
Ellsworth Quad.: Berryhill, H. L., Jr., 3
Hackett Quad.: Kent, B. H., 2
Mather Quad.: Kent, B. H., 5
Monongahela Quad.: Roen, J. B., 1
Washington East Quad.: Swanson, V. E., 1
Washington West Quad.: Berryhill, H. L., Jr., 4
- Westmoreland County
Donegal Quad.: Shaffner, M. N., 1
Monongahela Quad.: Roen, J. B., 1
- Wyoming County, Ransom Quad.: Kehn, T. M., 2
- York County, Triassic, New Oxford Formation: Wood, P. R., 1
- Geomorphologic*
Chester County: Chester County Planning Commission, 1
Pennsylvania: Murphy, R. E., 1; Pa. Geol. Survey, 3
land-surface classes: Hammond, E. H., 1, 2
- Pennsylvania-Eastern, Delaware River Basin: Olmsted, F. H., 1
- Geophysical*
Pennsylvania
gravity: Am. Geophys. Union, 1
magnetic, horizontal intensity: U. S. Coast and Geod. Survey, 1
magnetic, isoclinic charts: U. S. Coast and Geod. Survey, 2
magnetic, vertical intensity: U. S. Coast and Geod. Survey, 3
- Glacial geology*
Bradford County: Denny, C. S., 2
Lycoming County: Denny, C. S., 2
Pennsylvania-Northeastern, Wisconsin drift: Denny, C. S., 2

- Sullivan County: Denny, C. S., 2
 Tioga County: Denny, C. S., 2
- Ground water*
- Adams County, Triassic, New Oxford Formation: Wood, P. R., 1
 analyses: Feth, J. H., 1
- Berks County
 Lebanon Valley: Meisler, H., 4
 Triassic, Brunswick Formation: Longwill, S. M., 2
- Bucks County
 analyses: Greenman, D. W., 1
 artesian water: Greenman, D. W., 1
 water resources: Greenman, D. W., 1
 well locations: Greenman, D. W., 1
- Chester County: Chester County Planning Commission, 1
 metamorphic rocks: Poth, C. W., 5
- Dauphin County, Ordovician, Martinsburg Formation: Carswell, L. D., 3
- Delaware County
 analyses: Greenman, D. W., 1
 artesian water: Greenman, D. W., 1
 water sources: Greenman, D. W., 1
 western: Poth, C. W., 5
- Lancaster County
 eastern: Poth, C. W., 5
 Lancaster Quad., carbonate rocks: Meisler, H., 5
 Triassic, New Oxford Formation: Johnston, H. E., 1
- Lebanon County
 Lancaster Quad., carbonate rocks: Meisler, H., 4
 Lebanon Valley: Meisler, H., 4
- Lehigh County, carbonate rocks: Flippo, H. N., Jr., 1
- Montgomery County, Triassic, Brunswick Formation: Longwill, S. M., 2
- Pennsylvania: Pa. Geol. Survey, 9
 analyses: Feth, J. H., 1
 aquifers: McGuinness, C. L., 2
 producing aquifers: U. S. Geol. Survey, 5
 resources: Miller, D. W., 1
- Pennsylvania-Eastern, Schuylkill River Basin, availability: Biesecker, J. E., 1
- Pennsylvania-Southeastern
 quality: Biesecker, J. E., 1
 Swatara Creek Basin: Stuart, W. T., 3
 Triassic, Stockton Formation
 water quality: Rima, D. R., 1
 well locations: Rima, D. R., 2
- Philadelphia County
 analyses: Greenman, D. W., 1
 artesian water: Greenman, D. W., 1
 water sources: Greenman, D. W., 1
- York County, Triassic, New Oxford Formation: Wood, P. R., 1
- Isopachous*
- Bucks County, Cretaceous units: Greenman, D. W., 1
- Clarion County, Pennsylvanian, Vanport Limestone: Williams, E. G., 6
- Erie County
 Devonian, Oriskany Sandstone, Pierce gas field: Kelley, D. R., 4
 Silurian, Medina Sandstone, Pierce gas field: Kelley, D. R., 4
- Forest County, Devonian, Red Valley Sandstone: Kelley, D. R., 2
- Pennsylvania
 Mississippian: Walker, R. R., 1
 Paleozoic systems: Sloss, L. L., 1
 Silurian, Salina Group: Fergusson, W. B., 1
 Silurian salt: Pierce, W. G., 1
- Pennsylvania-Northern
 Silurian, Salina Group: Rickard, L. V., 1
 Silurian, Salina units: Rickard, L. V., 1
- Pennsylvania-Northwestern
 Devonian, Chemung sands: Wolfe, R. T., Jr., 1
 Silurian, Salina Group: Rickard, L. V., 1
 Silurian, Salina units: Rickard, L. V., 1
- Pennsylvania-Southwestern
 Cambrian: Woodward, H. P., 3
 Ordovician: Woodward, H. P., 3
- Pennsylvania-Western
 Silurian: Cate, A. S., 8
- Pennsylvanian
 Clarion coals: Williams, E. G., 6
 Lower Kittanning Shale: Williams, E. G., 6
 Vanport Limestone: Williams, E. G., 6
- Philadelphia County, Cretaceous units: Greenman, D. W., 1
- Venango County, Devonian, Red Valley Sandstone: Kelley, D. R., 2
- Warren County, Devonian
 Glade Sandstone, Youngsville Quad.: McGlade, W. G., 1
 Red Valley Sandstone: Kelley, D. R., 2
- Lithofacies*
- Lancaster County, Wissahickon Schist: Southwick, D. L., 1
- Pennsylvania
 Mississippian: Walker, K. R., 1
 Paleozoic systems: Sloss, L. L., 1
 Silurian, Salina Group: Fergusson, W. B., 1

- Pennsylvania-Northern, Silurian, Salina Group: Rickard, L. V., 1
- Pennsylvania-Northwestern, Silurian, Salina units: Rickard, L. V., 1
- York County, Wissahickon Schist: Southwick, D. L., 1
- Lithologic*
- Washington County
- Ellsworth Quad.: Kent, B. H., 7
- Hackett Quad.: Kent, B. H., 7
- Palaeocological*
- Pennsylvania-Southwestern, Permian, Dunkard Basin: Berryhill, H. L., Jr., 6
- Palaeogeographic*
- Pennsylvania-Western, Pennsylvanian, Lower Kittanning Coal: Williams, E. G., 6
- Palinspastic*
- Bedford County, Devonian: Dennison, J. M., 1
- Pennsylvania-Southwestern, Palaeozoic: Dennison, J. M., 2
- Sedimentary petrologic*
- Pennsylvania-Southeastern, Triassic: Glaeser, J. D., 5
- Soil*
- Bradford County: Denny, C. S., 2
- Lyeoming County: Denny, C. S., 2
- Sullivan County: Denny, C. S., 2
- Tioga County: Denny, C. S., 2
- Structure*
- Bucks County, basement surface: Greenman, D. W., 1
- Clinton County, northern: Colton, G. W., 5
- Lyeoming County, western: Colton, G. W., 5
- Pennsylvania
- basement: Am. Assoc. Pet. Geol., 1
- deformation mechanics: Gwinn, V. E., 3
- major features: Republic Explor. Co., 1; Riggs, E. A., 1
- plateau region: Cate, A. S., 2
- tectonics: King, P. B., 2, 4, 5; U. S. Geol. Survey, 1
- Pennsylvania-Northeastern, Southern Anthracite Field, western: Wood, G. H., Jr., 14
- Pennsylvania-Western, joints: Nickelsen, R. P., 3
- Philadelphia County, Coastal Plain basement surface: Greenman, D. W., 1
- Potter County, southeastern: Colton, G. W., 5
- Tioga County, southwestern: Colton, G. W., 5
- Structure contour*
- Allegheny County, Pennsylvanian, Pittsburgh Coal, Monongahela Quad.: Roen, J. B., 1
- Armstrong County, Devonian, Venango Sandstone, Foxburg Quad.: Bergrsten, J. M., 1
- Bradford County, Devonian, Corning Sandstone, northern: Woodrow, D. L., 6
- Bucks County, Cretaceous units: Greenman, D. W., 1
- Butler County, Devonian, Venango Sandstone, Foxburg Quad.: Bergrsten, J. M., 1
- Clarion County, Devonian, Venango Sandstone, Foxburg Quad.: Bergrsten, J. M., 1
- Clinton County, Devonian conglomerate, Slate Run Quad.: Colton, G. W., 4
- Eric County
- Devonian, Oriskany Sandstone, Pierce gas field: Kelley, D. R., 4
- Silurian, Medina Sandstone, Pierce gas field: Kelley, D. R., 4
- Fayette County, Pennsylvanian
- Pittsburgh Coal, California Quad.: Schweinfurth, S. P., 1
- Pittsburgh Coal, Mather Quad.: Kent, B. H., 5
- Upper Freeport Coal, Donegal Quad.: Shaffner, M. N., 1
- Greene County, Pennsylvanian, Pittsburgh Coal
- Amity Quad.: Berryhill, H. L., Jr., 2
- Carmichaels Quad.: Kent, B. H., 4
- Mather Quad.: Kent, B. H., 5
- Jefferson County, Devonian, Elk Run gas field: Heyman, L., 1
- Laekawanna County, Pennsylvanian, Pottsville Formation: Kehn, T. M., 2
- Luzerne County, Pennsylvanian, Pottsville Formation, Ransom Quad.: Kehn, T. M., 2
- Lyeoming County, Devonian conglomerate
- Cedar Run Quad.: Colton, G. W., 2
- Slate Run Quad.: Colton, G. W., 4
- Waterville Quad.: Colton, G. W., 6
- Northumberland County, Pennsylvanian, Buck Mountain Coal, Shamokin Quad.: Danilchik, W., 1
- Pennsylvania, Silurian, Salina Formation: Pierce, W. G., 1
- Pennsylvania-Northern, Silurian, Vernon Formation: Rickard, L. V., 1
- Pennsylvania-Northwestern, Silurian, Vernon Formation: Rickard, L. V., 1

- Pennsylvania-Southwestern, Devonian,
Oriskany Sandstone, Punxsutawney-
Driftwood field: Lytle, W. S., 6
- Pennsylvania-Western
Ordovician, Irondequoit Formation:
Cate, A. S., 8
Ordovician, Queenston Shale: Cate,
A. S., 8
Precambrian: Summerson, C. H., 1
Silurian, Salina Formation: Cate, A.
S., 8
- Philadelphia County, Cretaceous units:
Greenman, D. W., 1
- Potter County, Devonian conglomerate,
Slate Run Quad.: Colton, G. W., 4
- Somerset County, Pennsylvanian
Upper Freeport Coal, Donegal Quad.:
Shaffner, M. N., 1
Upper Kittanning Coal, southern:
Flint, N. K., 3
- Tioga County, Devonian conglomerate,
Cedar Run Quad.: Colton, G. W.,
2
- Venango County, Devonian, Venango
Sandstone, Foxburg Quad.: Berg-
sten, J. M., 1
- Warren County, Devonian
Glade Sandstone, Youngsville Quad.:
McGlade, W. G., 1
"pink rocks", Warren Quad.: Lytle,
W. S., 16
- Washington County
Mississippian, Big Injun Sandstone:
McGlade, W. G., 3
Pennsylvanian, Pittsburgh Coal
Amity Quad.: Berryhill, H. L.,
Jr., 2
California Quad.: Schweinfurth,
S. P., 1
Carmichaels Quad.: Kent, B. H., 4
Ellsworth Quad.: Berryhill, H. L.,
Jr., 3
Hackett Quad.: Kent, B. H., 2
Mather Quad.: Kent, B. H., 5
Monongahela Quad.: Roen, J. B., 1
Washington East Quad.: Swanson,
V. E., 1
Washington West Quad.: Berry-
hill, H. L., Jr., 4
- Westmoreland County, Pennsylvanian
Pittsburgh Coal, Monongahela Quad.:
Roen, J. B., 1
Upper Freeport Coal, Donegal Quad.:
Shaffner, M. N., 1
- Wyoming County, Pennsylvanian, Potts-
ville Formation, Ransom Quad.:
Kehn, T. M., 2
- McKEAN COUNTY, see also** Pennsylvania,
Pennsylvania-Northwestern, and Penn-
sylvania-Northern
- Economic geology*
petroleum, Bradford oil field: Fettke,
C. R., 9; Halbouty, M. T., 1;
McCaslin, J. C., 2
- Ground water*
Bradford oil field water: Fettke, C. R.,
10
- Palaeontology*
gymnosperms, Devonian
Oswayo Sandstone: Pettitt, J. M., 2
Pocono Sandstone: Pettitt, J. M., 1
- Sedimentary petrology*
Devonian
Bradford oil field, permeability:
Fettke, C. R., 3, 6, 7
Cooper Sand: Evans, D. M., 1
sandstones: Overbey, W. K., Jr., 1;
Smith, C. M., Jr., 1
- Structural geology*
joints
Bradford oil field: Overbey, W. K.,
Jr., 3
Devonian: Heck, E. T., 1
- MERCER COUNTY, see also** Pennsylvania,
and Pennsylvania-Western
- Absolute age*
Quaternary deer: Guilday, J. E., 7
- Areas described*
Neshannock Quad., guidebook: Cars-
well, L. D., 2
- Earthquakes*
1873: Rockwood, C. G., Jr., 1
- Geophysical investigations*
gravity, glacial valleys: Rankin, W. E.,
1
- Ground water*
Mercer Quad.: Poth, C. W., 2, 4
multiaquifer wells: Bennett, G. D., 1
Neshannock Quad.: Carswell, L. D., 1
Shenango Quad.: Kimmel, G. E., 1, 2
Stoneboro Quad.: Kimmel, G. E., 1, 2
- Maps*
geologic
Mercer Quad.: Poth, C. W., 2
Neshannock Quad.: Carswell, L. D.,
1
- Paleontology*
Mammalia, Quaternary, Pymatuning
Lake: Guilday, J. E., 7
- Petrology*
Precambrian: Saylor, T. E., 1
- Stratigraphy*
Devonian: Dow, J. W., 1
Mississippian-Pennsylvanian, Mercer
Quad.: Poth, C. W., 2
Ordovician-Pennsylvanian, Neshannock
Quad.: Carswell, L. D., 1
Pennsylvanian: Carswell, L. D., 2
Pleistocene, Mercer Quad.: Poth, C.
W., 2

- MERCURY**, *see also* Mineral resources
 Pennsylvania-Eastern, with zinc deposits:
 Jolly, J. L. W., 1
- MESOZOIC**, *see also* individual periods
 Pennsylvania, paleoclimatology: Bain, G.
 W., 1
- METABASALT**
 Adams-Franklin Counties, Iron Spring
 Quad.: Landy, R. A., 1
- METAMORPHIC ROCKS**, *see also* indi-
 vidual species
 Chester County, graphite schist: Siegrist,
 H. G., Jr., 1
 Pennsylvania-Southeastern
 mica spacing: Warner, J., 1
 popular: Lapham, D. M., 4
 retrograde rocks: Roberts, F. H., 1
- METEORITES**
 Bald Eagle: Horback, H., 1
 Black Moshannon: Mason, B., 2
 Mount Joy: Horback, H., 1; Mason, B.,
 3; Meteoritics, 1; Turekian, K. K.,
 2
 age: Anders, E., 1
 analyses: Hara, T., 1
 beryllium: Chang, C., 1
 classification: Goldstein, J. I., 1; Hen-
 derson, E. P., 1; Mason, B., 1
 shock effects: Jain, A. V., 1
 New Baltimore: Henderson, E. P., 1;
 Horback, H., 1; Mason, B., 3
 classification: Goldstein, J. I., 1; Was-
 son, J. T., 1
 shock effects: Jaeger, R. R., 1
 Pennsylvania: Stone, R. W., 1
 Pittsburgh: Horback, H., 1; Mason, B.,
 3; Turekian, K. K., 2
 Shrewsbury: Horback, H., 1; Mason, B.,
 3; Turekian, K. K., 2
- MICA**, *see also* Mineral resources
 Lancaster County, Womelsdorf Quad.:
 Geyer, A. R., 1
- MIFFLIN COUNTY**, *see also* Pennsylvania,
 and Pennsylvania-Central
Areas described
 Mifflintown Quad.: Conlin, R. R., 1
Economic geology
 stone, Mifflintown Quad.: Conlin, R. R.,
 1
Geomorphology
 Allensville Cave: Smeltzer, B. L., 1
 Barrville Cave: Smeltzer, B. L., 38
 Big Ridge Cave: Clark, L., 1; Davis, N.
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Washington County, albertite: King, L. H., 1

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Pennsylvania-Central, Nealmont Limestone: Niekey, D. A., 1

Silurian

Blair County, Rose Hill Formation: Martinsson, A., 1

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Centre County, Ordovician carbonate rocks: Weber, J. N. E., 1

Chester County, serpentine: Taylor, H. P., Jr., 1

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Echinodermata, Kinzers Formation: Durham, J. W., 1

Trilobita, Kinzers Formation: Rasetti, F. R. D., 2

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Kinzers Formation, fauna: Campbell, L. D., 1

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Brahiopoda: Rowell, A. J., 1

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- Cambria County, Gastropoda, Brush Creek Limestone: Knight, J. B., 1
- Clearfield County, Crustacea, Upper Kittanning Shale: Tasch, P., 1
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 coal swamps: Koppe, E. F., 3
 coals, sedimentary petrography: Ting, F. T. C., 1, 2
 Columbiana Shale: Groth, P. K. H., 1
 Conemaugh Group: Flint, N. K., 1
 depositional environments: Morrils, D. A., 1
 cycles: Ferm, J. C., 4; Williams, E. G., 6
 clay minerals: Webb, D. K., Jr., 1
 delta sedimentation: Cavaroc, V. V., Jr., 1, 2
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 ironstone nodules, carbon isotopes: Weber, J. N. E., 2
 Kittanning Formation, marine beds: Ferm, J. C., 6
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 Lower Allegheny rocks: Baroffio, J. R., 1, 2
 Monongahela Series: Arkle, T., Jr., 1
 paleogeography: Ferm, J. C., 2
 paleotopography: Reidenouer, D. R., 1, 2, 3
 peat environments: Habib, D., 3
 Pottsville and Allegheny rocks: Williams, E. G., 4
 Pottsville Conglomerate: Meckel, L. D., Jr., 3
 paleocurrents: Meckel, L. D., Jr., 1
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 carbon isotopes: Weber, J. N. E., 5
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- Potter County, Slate Run Quad.: Colton, G. W., 4
- Schuylkill County
 coal ages: Darrah, W. C., 8
 Klingerstown Quad.: Trexler, J. P., 5, 6
 Minersville Quad.: Wood, G. H., Jr., 7
 Pine Grove Quad.: Wood, G. H., Jr., 8
 Shenandoah Quad.: Wood, G. H., Jr., 13

- Swatara Hill Quad.: Wood, G. H., Jr., 9
 Tower City Quad.: Wood, G. H., Jr., 10
 Tremont Quad.: Wood, G. H., Jr., 11
 southern: Wood, G. H., Jr., 2
 Valley View Quad.: Trexler, J. P., 5, 6, 9
- Somerset County
 cross bedding: Balsinger, D. F., 1
 Deer Valley Limestone: McQuillin, T. A., 1
 Donegal Quad.: Shaffner, M. N., 1
 northern: Flint, N. K., 2
 southern: Flint, N. K., 3
- Tioga County, Cedar Run Quad.: Colton, G. W., 2
- Venango County, Foxburg Quad.: Bergsten, J. M., 1
- Warren County
 Warren Quad.: Lytle, W. S., 9, 16
 Youngsville Quad.: McGlade, W. G., 1
- Washington County
 Amity Quad.: Berryhill, H. L., Jr., 2;
 McGlade, W. G., 3
 California Quad.: Schweinfurth, S. P., 1
 Carmichaels Quad.: Kent, B. H., 4
 Claysville Quad.: McGlade, W. G., 3
 Ellsworth Quad.: Berryhill, H. L., Jr., 3
 guidebook: Kent, B. H., 1
 Hackett Quad.: Kent, B. H., 2
 Mather Quad.: Kent, B. H., 5
 Monongahela Quad.: Roen, J. B., 1
 nomenclature: Berryhill, H. L., Jr., 1, 5
 Washington East Quad.: Swanson, V. E., 1
 Washington West Quad.: Berryhill, H. L., Jr., 4
- Westmoreland County
 Donegal Quad.: Shaffner, M. N., 1
 Monongahela Quad.: Roen, J. B., 1
- Wyoming County, Ransom Quad.: Kehn, T. M., 2
- PERIDOTITE**
 Pennsylvania-Western: Brownfield, J., 1;
 Deines, P., 1, 2
- PERMIAN PERIOD**, *see also* Paleozoic Era
 Allegheny County, Monongahela Quad.: Roen, J. B., 1
- Fayette County
 California Quad.: Schweinfurth, S. P., 1
 data bank: Kent, B. H., 8
 Mather Quad.: Kent, B. H., 5
- Greene County
 Amity Quad.: Berryhill, H. L., Jr., 2
- Carmichaels Quad.: Kent, B. H., 4
 data bank: Kent, B. H., 8
 Greene Formation: Swain, F. M., Jr., 6
 Mather Quad.: Kent, B. H., 5
- Pennsylvania-Southwestern
 Appalachian Basin: Barrett, E., 1
 Dunkard Basin: Berryhill, H. L., Jr., 6, 7
 Dunkard Group: Martin, W. D., 1, 2
 cyclothems. Beerbower, J. R., 2
 Pennsylvanian boundary plants: Bode, H., 1
 stratigraphic terminology: Keroher, G. C., 1
- Washington County
 Amity Quad.: Berryhill, H. L., Jr., 2
 California Quad.: Schweinfurth, S. P., 1
 Carmichaels Quad.: Kent, B. H., 4
 Ellsworth Quad.: Berryhill, H. L., Jr., 3
 guidebook: Kent, B. H., 1
 Hackett Quad.: Kent, B. H., 2
 Mather Quad.: Kent, B. H., 5
 Monongahela Quad.: Roen, J. B., 1
 nomenclature: Berryhill, H. L., Jr., 1, 5
 Washington East Quad.: Swanson, V. E., 1
 Washington West Quad.: Berryhill, H. L., Jr., 4
- Westmoreland County
 Donegal Quad.: Shaffner, M. N., 1
 Monongahela Quad.: Roen, J. B., 1
- PERRY COUNTY**, *see also* Pennsylvania, and Pennsylvania-Central
- Areas described*
 Loysville Quad.: Miller, J. T., 1
 Mifflintown Quad.: Conlin, R. R., 1
 Millerstown Quad., southern: Robinson, G. C., 1
 New Bloomfield Quad.: Dyson, J. L., 1, 2
- Economic geology*
 mineral resources
 Loysville Quad.: Miller, J. T., 1
 New Bloomfield Quad., northern: Dyson, J. L., 1
 stone
 Mifflintown Quad.: Conlin, R. R., 1
 New Bloomfield Quad., southern: Dyson, J. L., 2
- Geomorphology*
 Bixler Run watershed: Culbertson, J. K., 1
 Longs Cave: Smeltzer, B. L., 7
- Ground water*
 hot springs: Waring, G. A., 1

Maps

geologic

- Loysville Quad.: Miller, J. T., 1
- Mifflintown Quad.: Conlin, R. R., 1
- New Bloomfield Quad.: Dyson, J. L., 1, 2

Paleontology

- Brachiopoda, Devonian, Montebello Sandstone: Johnson, J. G., 1
- palynomorphs, Silurian: Cramer, F. H., 2
- Pisces, Silurian: Denison, R. H., 1; Eastman, C. R., 1
- Bloomsburg Formation: Whitley, G. P., 1
- Landisburg Sandstone: Denison, R. H., 2

Sedimentary petrology

- Devonian, Catskill Formation, clastic dikes: Wells, R. B., 1

Stratigraphy

Ordovician-Devonian

- Loysville Quad.: Miller, J. T., 1
- Mifflintown Quad.: Conlin, R. R., 1
- Ordovician-Mississippian, New Bloomfield Quad., southern: Dyson, J. L., 2
- Pleistocene, New Bloomfield Quad.: northern: Dyson, J. L., 1
- Quaternary, New Bloomfield Quad.: southern: Dyson, J. L., 2
- Silurian-Devonian, New Bloomfield Quad., northern: Dyson, J. L., 1
- Triassic, New Bloomfield Quad: Dyson, J. L., 1, 2

PETROLEUM, *see also* Mineral resources, and Natural gas

- Armstrong County, Foxburg Quad.: Bergsten, J. M., 1
- Bradford County, northern: Woodrow, D. L., 6
- Butler County, Foxburg Quad.: Bergsten, J. M., 1
- Clarion County, Foxburg Quad.: Bergsten, J. M., 1
- Clearfield County: Brown, W. R., 3d, 9
- Elk County, Kane Sand, Devonian: U. S. Bureau Mines, 6
- Erie County: Donnan, B. C., 1
- Forest County: Kelley, D. R., 2
- Greene County, Carmichaels Quad.: Kent, B. H., 4
- history: Hubbert, M. K., 1
- Jefferson County: Brown, W. R., 3d, 9
- Punxsutawney-Driftwood area: Brown, W. R., 3d, 4
- McKean County
- Bradford oil field: Fettke, C. R., 9; Halbouty, M. T., 1; McCaslin, J. C., 2

- Pennsylvania: Brown, W. R., 3d, 10; Wagner, W. R., 8
- potential: Schramm, M. W., Jr., 1; Sherrill, R. E., 1
- review: Ingham, A. I. 1; Kelley, D. R., 5; Lytle, W. S., 1, 2, 3, 4, 5, 7, 8, 11, 13, 14, 17, 18, 20, 21; Woodward, H. P., 2
- Pennsylvania-Central: Brown, W. R., 3d, 1, 8
- potential: Hull, J. P. D., 1
- Pennsylvania-Northeastern: Brown, W. R., 3d, 7, 8
- Pennsylvania-Northwestern: Brown, W. R., 3d, 3
- Cambrian-Ordovician, potential: McCaslin, J. C., 1
- history, guidebook: Lytle, W. S., 15
- potential: Grunau, J. C., 2
- Silurian: Brown, W. R., 3d, 5
- Pennsylvania-Southwestern: Brown, W. R., 3d, 6
- developments: Galey, J. T., 1
- Pennsylvania-Western: Barrett, E., 1; Brown, W. R., 3d, 11; Brundage, H. T., 1
- early account: Buck, W. J., 1
- Lower Paleozoic: Brown, W. R., 3d, 2
- Ordovician, potential: Fettke, C. R., 12
- review: Fettke, C. R., 4, 13, 15, 16, 17, 18, 19; McGlade, W. G., 2; Oil and Gas Jour., 3, 6
- secondary recovery, influence of geology: Fettke, C. R., 14
- shallow oil fields: Ball Assocs., 1
- Silurian, potential: Fettke, C. R., 12
- Venango County
- Devonian, Red Valley Sandstone: Kelley, D. R., 2
- Foxburg Quad.: Bergsten, J. M., 1
- Titusville-Oil City district: Maxwell, N. E., 1
- Warren County
- Devonian, Glade Sandstone: Linn, E. H., 3
- Warren Quad.: Lytle, W. S., 9, 16
- Youngsville Quad.: McGlade, W. G., 1
- Youngsville-Sugar Grove field: Siefert, W. H., 1
- Washington County
- Amity Quad.: McGlade, W. G., 3
- Carmichaels Quad.: Kent, B. H., 4
- Claysville Quad.: McGlade, W. G., 3
- Ellsworth Quad.: Berryhill, H. L., Jr., 3
- Hackett Quad.: Kent, B. H., 2
- PHILADELPHIA COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Southeastern**
- Absolute age*
- gneiss: Aldrich, L. T., 1

- Pleistocene, subway tree: Richards, H. G., 1
- Quaternary, subway tree: Ralph, E. K., 1
- Areas described*
- Coastal Plain: Murray, G. E., 1
- Philadelphia area, guidebook: Goodwin, B. K., 3
- Geobotanical investigations*
- vegetation-topographic relations: Harshberger, J. W., 2
- Geomorphology*
- Center Cave: Bailey, C., 1
- stream flow, Wissahickon Schist: Morisawa, M. E., 2, 3
- Wissahickon Schist, rock controls: Goodwin, B. K., 2
- Geophysical investigations*
- aeromagnetic, Hatboro Quad.: Socolow, A. A., 2
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- Philadelphia Naval Base: Graham, J. B., 2
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- aeromagnetic, Hatboro Quad.: Bromery, R. W., 5
- ground water
- artesian water: Greenman, D. W., 1
- chemistry: Greenman, D. W., 1
- water sources: Greenman, D. W., 1
- isopachous, Cretaceous units: Greenman, D. W., 1
- structure, basement surface: Greenman, D. W., 1
- structure contour, Cretaceous units: Greenman, D. W., 1
- Stratigraphy*
- Cretaceous, Coastal Plain: Murray, G. E., 1
- Pleistocene, Coastal Plain: Murray, G. E., 1
- Precambrian, Wissahickon Schist: Keller, A., 1
- PHOSPHATE**, *see also* phosphate-bearing minerals, and Mineral resources
- Juniata County: Carter, W. D., 1
- PHOSPHOROUS**, *see also* phosphorous-bearing minerals, and Mineral resources
- Pennsylvania, coal: Abernethy, R. F., 2
- PIKE COUNTY**, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Northeastern
- Areas described*
- Port Jervis Quad.: Schuberth, C. J., 1
- Sedimentary petrology*
- Devonian, Fort Littleton Formation: Frakes, L. A., 4
- Bradford County, Chemung Formation: Newberry, J. S., 1
- Clinton County, Oswayo Formation: Thomson, K. S., 1
- Pennsylvania-Northeastern, aestivation chambers: Woodrow, D. L., 8
- Pennsylvania-Western: Eastman, C. R., 1
- Tioga County: Broom, R., 1
- Catskill Formation: Gregory, W. K., 1
- Silurian, Monroe County, Bloomsburg Formation: Denison, R. H., 2
- Perry County: Denison, R. H., 1; Eastman, C. R., 1
- Bloomsburg Formation: Whitley, G. P., 1
- Landisburg Sandstone: Denison, R. H., 2
- PLANTS**, *see also* individual types
- Devonian, Pennsylvania-Northern: Beck, C. B., 1
- Mississippian
- Dauphin County, Pocono Formation: Darrah, W. C., 1
- Pennsylvania, floral zones: Read, C. B., 1, 2
- Pennsylvanian
- Pennsylvania: Bassler, H., 1; Darrah, W. C., 4
- Permian, Pennsylvania-Southwestern
- floral zones: Read, C. B., 1
- Pennsylvanian-Permian boundary: Bode, H., 1
- PLEISTOCENE EPOCH**, *see also* Cenozoic Era, and Quaternary Period
- Allegheny County, Monongahela Quad.: Roen, J. B., 1
- Bedford County
- bones, absolute age: Crane, H. R., 1
- lemmings: Guilday, J. E., 9
- Bucks County
- Frenchtown Quad.: Drake, A. A., Jr., 2
- Riegelsville Quad.: Drake, A. A., Jr., 6
- Butler County, Mercer Quad.: Poth, C. W., 2
- Centre County, Hosterman's Pit Cave, charcoal: Crane, H. R., 2
- Crawford County
- pollen spectra: Walker, P. C., 1
- Pymatuning Lake, peat: Ogden, J. G., 3d, 1
- Titusville Till: White, G. W., 1
- Erie County, glacial lakes: Dreimanis, A., 3
- Fayette County, California Quad.: Schweinfurth, S. P., 1
- Lawrence County
- Mercer Quad.: Poth, C. W., 2
- Neshannock Quad.: Carswell, L. D., 1

Luzerne County, Ransom Quad.: Kehn, T. M., 2

Mercer County

Mercer Quad.: Poth, C. W., 2

Neshannock Quad.: Carswell, L. D., 1

Northampton County, Bangor Quad.: Davis, R. E., 1

Pennsylvania

mastodon extinction: Dreimanis, A., 2

periglacial conditions: Brunnenschweiler, D. H., 1

phytogeography: Whitehead, D. R., 1

popular: Shepps, V. C., 2

post-glacial forests: Braun, E. L., 1

Pennsylvania-Northern, pollen analyses: Davis, M. B., 1

Pennsylvania-Northwestern: White, G. W., 4

glacial geology: White, G. W., 3

post-glacial uplift: MacLean, W. F., 1

Pennsylvania-Southeastern, pollen spectra: Sirkin, L. A., 1

Pennsylvania-Western, Ohio River, drainage changes: Carlston, C. W., 1

Philadelphia County, Coastal Plain: Murray, G. E., 1

Union County, glacial deposits: Wells, J. A., 1

Washington County

California Quad.: Schweinfurth, S. P., 1

Carmichaels Quad., guidebook: Kent, B. H., 1

Monongahela Quad.: Roen, J. B., 1

Washington East Quad.: Swanson, V. E., 1

Westmoreland County, Monongahela Quad.: Roen, J. B., 1

Wyoming County, Ransom Quad.: Kehn, T. M., 2

POPULAR AND ELEMENTARY GEOLOGY

Appalachian Mountains: Connelly, T. L., 1

boulder fields: Carbon County, Hickory Run Park: Geyer, A. R., 2

Brachiopoda, Devonian, Erie County: Pa. Geol. Survey, 6

calcite, York County, Thomasville quarry: Broughton, P., 2

cave biota, Bedford County: McCrady, A. D., 3

coal, Pennsylvania: Edmunds, W. E., 1; Huebner, F. M., 1

common fossils: Hoskins, D. M., 3, 9; Seaman, D. M., 1

common rocks and minerals: Lapham, D. M., 4

Erie County, geology and geography: Tomikel, J. C., 2

Fayette County, structural geology: Tomikel, J. C., 4

fossil collecting: Murray, M., 1

garnet, Chester County: Pough, F. H., 1

geology of Pennsylvania: Myers, R. E., 2; Willard, B., 2

ground water: Emrich, G. H., 2

history, early observations: Willard, B., 5

mammalia, Pleistocene: Guilday, J. E., 2, 3; McCrady, A. D., 1

minerals: Lapham, D. M., 12; Nicolay, H. H., 1; Oles, F., 1; Pearl, R. M., 1; Zeitner, J. C., 1

Lehigh County: Broughton, P., 1

Pennsylvania State Mineral: Myers, R. E., 1

Pennsylvania-Southeastern: Broughton, P., 3; MacFall, R. P., 1

peat: Pa. Geol. Survey, 7

Pennsylvania-Southeastern, South Mountain area: Shirk, W. R., 1

Philadelphia County, guidebook: Goodwin, B. K., 3

Pleistocene, Pennsylvania: Shepps, V. C., 2

Reptilia, Triassic

Lancaster County: Colbert, E. H., 2

Pennsylvania-Southeastern: Richards, H. G., 6

rock collecting: Ransome, J. E., 1

Trough Creek State Park, Blair County: Wilshusen, J. P., 1

PORIFERA, *see also* Invertebrata

Mississippian, Pennsylvania-Northwestern, Corry Sandstone: Sass, D. B., 1

Ordovician, Huntingdon County, Bellefonte Dolomite: Butler, P. E., 1

POTASSIUM, *see also* potassium-bearing minerals, and Mineral resources

Pennsylvania, coal: Abernethy, R. F., 2

POTTER COUNTY, *see also* Pennsylvania, and Pennsylvania-Northern

Areas described

Slate Run Quad.: Colton, G. W., 4

Economic geology

stone, Slate Run Quad.: Colton, G. W., 4

Geomorphology

drainage patterns: Smart, J. S., 1

tree fall: Malde, H. E., 1

Geophysical investigations

heat flow: Joyner, W. B., 1

Maps

geologic, Slate Run Quad.: Colton, G. W., 4

structure: Colton, G. W., 5

structure contour, Devonian conglomerate, Slate Run Quad.: Colton, G. W., 4

Stratigraphy

Devonian-Pennsylvanian, Slate Run Quad.: Colton, G. W., 4

PRECAMBRIAN

- Adams County
Caledonia Park area: Fauth, J. L., 2
Catoctin Formation: Rankin, D. W., 1
Mount Holly Springs Quad.: Freedman, J. L., 2
- Berks County
Reading Quad.: Buckwalter, T. V., Jr., 2
Womelsdorf Quad.: Geyer, A. R., 1
- Bucks County, Riegelsville Quad.: Drake, A. A., Jr., 6; Epstein, J. B., 3
- Chester County
Baltimore Gneiss: Thurston, P. C., 1; Tilton, G. R., 1
absolute age: Hart, S. R., 1, 2
metamorphic rocks: Poth, C. W., 5
- Crawford County, subsurface: Saylor, T. E., 1; Summerson, C. H., 1
- Cumberland County, Caledonia Park area: Fauth, J. L., 2
- Delaware County: Poth, C. W., 5
- Erie County, subsurface: Saylor, T. E., 1
- Franklin County
Caledonia Park area: Fauth, J. L., 2
southeastern: Root, S. I., 2
- Lancaster County
eastern: Poth, C. W., 5
Muddy Run, Wissahickon Schist: Wilson, S. D., 1
Susquehanna River area: Kauffman, M. E., 1
Womelsdorf Quad.: Geyer, A. R., 1
- Lebanon County, Womelsdorf Quad.: Geyer, A. R., 1
- Lehigh County, Reading Hills: Mackenzie, F. T., 1
- Mercer County, subsurface: Saylor, T. E., 1
- Montgomery County, Baltimore Gneiss: Tilton, G. R., 1
- Northampton County
Easton Quad.: Drake, A. A., Jr., 5
Reading Hills: Mackenzie, F. T., 1
- Pennsylvania
basement: Muehlenberger, W. R., 1
orogenic history: Rodgers, J., 3
- Pennsylvania-Southeastern
absolute age: Bass, M. N., 1
Delaware River Basin: Olmsted, F. H., 1
Glenarm Series: Kauffman, M. E., 2
guidebook: Drake, A. A., Jr., 8
- Philadelphia County, Wissahickon Schist: Keller, A., 1
- York County
Mount Holly Springs Quad.: Freedman, J. L., 2
Wissahickon Schist: Hanscom, R., 1

PREHNITE

- Chester County: Haefner, R. C., 1

PTERIDOPHYTA, *see also* Plants, and Paleobotany

- Pennsylvanian
Lawrence County, Washington Shale: Cross, A. T., 2
Pennsylvania, *Alethopteris*: Wagner, R. H., 1
Pennsylvania-Western, *Pecopteris*: Morey, E. L. D., 1
Triassic, York County, New Oxford Formation: Boek, W., 2

PTERIDOSPERMA, *see also* Plants, and Paleobotany

- Pennsylvanian
Pennsylvania-Northern, Allegheny Group: Delevoryas, T., 1
Pennsylvania-Western: Darrah, W. C., 2

PYRITE, *see also* Mineral collecting

- Chester County, French Creek area: Marsters, B. A., 1

QUARTZITE

- Pennsylvania-Central, comparisons: Wood, G. V., 1, 2, 3

QUATERNARY PERIOD, *see also* Cenozoic Era, and Pleistocene Epoch

- Adams County, Caledonia Park area: Fauth, J. L., 2

- Berks County
Pine Grove Quad.: Wood, G. H., Jr., 8
Swatara Hill Quad.: Wood, G. H., Jr., 9

- Centre County, Bear Meadows, pollen spectra: Kovar, A. J., 1

- Cumberland County, Caledonia Park area: Fauth, J. L., 2

- Dauphin County
Klingerstown Quad.: Trexler, J. P., 7
New Bloomfield Quad.: Dyson, J. L., 1, 2

- Tower City Quad.: Wood, G. H., Jr., 10

- Fayette County, Mather Quad.: Kent, B. H., 5

- Franklin County
Caledonia Park area: Fauth, J. L., 2
southeastern: Root, S. I., 2

- Greene County
Amity Quad.: Berryhill, H. L., Jr., 2
Carmichaels Quad.: Kent, B. H., 4
Mather Quad.: Kent, B. H., 5

- Lebanon County
Pine Grove Quad.: Wood, G. H., Jr., 8
Tower City Quad.: Wood, G. H., Jr., 10

Northumberland County

Klingerstown Quad.: Trexler, J. P., 7

Tremont Quad.: Wood, G. H., Jr., 11

Valley View Quad.: Trexler, J. P., 9

Pennsylvania, tectonics: King, P. B., 3

Perry County, New Bloomfield Quad.:

Dyson, J. L., 1, 2

Philadelphia County, subway tree: Ralph, E. K., 1

Schuylkill County

Klingerstown Quad.: Trexler, J. P., 7

Lykens Quad.: Trexler, J. P., 8

Minersville Quad.: Wood, G. H., Jr., 7

Pine Grove Quad.: Wood, G. H., Jr., 8

Shenandoah Quad.: Wood, G. H., Jr.,

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Tower City Quad.: Wood, G. H., Jr.,

10

Tremont Quad.: Wood, G. H., Jr., 11

Valley View Quad.: Trexler, J. P., 9

Washington County

Amity Quad.: Berryhill, H. L., Jr., 2

Carmichaels Quad.: Kent, B. H., 4

Ellsworth Quad.: Berryhill, H. L., Jr.,

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Hackett Quad.: Kent, B. H., 2

Mather Quad.: Kent, B. H., 5

Washington West Quad.: Berryhill, H.

L., Jr., 4

RADIOACTIVITY SURVEYS, see Aero-radioactivity surveys

RARE EARTHS, see also Mineral resources
Chester County, monazite: Olson, J. C., 1

REPTILIA, see also Vertebrata

Pennsylvanian, Allegheny County, Cone-maugh Formation: Romer, A. S., 1

Permian, Pennsylvania-Southwestern: Bock, W., 3

Pleistocene

Bedford County, New Paris Sink: Guilday, J. E., 10

Blair County, Frankstown Cave: Gehlbach, F. R., 1

Centre County, Hosterman's Pit Cave: Landis, C., Jr., 1

Montgomery County, Port Kennedy Cave: Gehlbach, F. R., 1

York County, Bootlegger Sink: Guilday, J. E., 12

Triassic

Bucks County, Loekatong Formation, eoprolites: Haentschel, W., 1

Laneaster County, Blue Ball: Colbert, E. H., 2, 3

Pennsylvania-Southeastern: Camp, C. L., 1

Brunswick Formation: Gregory, J. T., 1

dinosaurs: Richards, H. G., 6

Loekatong Formation: Bock, W., 3

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Delaware River, sediments: Macdonald, R. B., 1

Pennsylvania

geological influences on chemistry: Durfor, C. N., 1

nitrogen compounds, origin: Feth, J. H., 2

sediment loads: Wark, J. W., 1

Pennsylvania-Central, geological controls: Parizek, R. R., 2

Schuylkill River, geology: White, W. F., 1

Susquehanna River, soil association and runoff: Miller, H. W., Jr., 1

ROOFING GRANULES, see also Mineral resources

Adams-Franklin Counties: Nelson, A., 1

RUBIDIUM, see also rubidium-bearing minerals, and Mineral resources

Pennsylvania, Susquehanna River: Khar-kar, D. P., 1

SALT, see also Mineral resources

Pennsylvania: Fergusson, W. B., 1; Landes, K. K., 1; Pierce, W. G., 1

Salina Group: Riekard, L. V., 1

SAND AND GRAVEL, see also Mineral resources

Cumberland County, Mount Holly Springs Quad.: Freedman, J. L., 2

Dauphin County, New Bloomfield Quad., northern: Dyson, J. L., 1

Franklin County, southeastern: Root, S. I., 2

Lackawanna County, Ransom Quad.: Kehn, T. M., 2

Luzerne County, Ransom Quad.: Kehn, T. M., 2

Pennsylvania-Northeastern, Southern Anthraeite Field: Wood, G. H., Jr., 14

Pennsylvania-Northwestern, glacial till: Shepps, V. C., 1

Perry County, New Bloomfield Quad., northern: Dyson, J. L., 1

Wyoming Quad.: Kehn, T. M., 2

SANDSTONE, see also Mineral resources, and Stone

Somerset County, southern: Flint, N. K., 3

Washington County, Hackett Quad.: Kent, B. H., 2

SCHUYLKILL COUNTY, see also Pennsylvania-Eastern, and Pennsylvania-Northeastern

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Klingerstown Quad.: Trexler, J. P., 5, 6, 7

- Lykens Quad.: Trexler, J. P., 5, 6, 8
Minersville Quad.: Wood, G. H., Jr., 7
Pine Grove Quad.: Wood, G. H., Jr., 8
Shenandoah Quad.: Wood, G. H., Jr., 13
Swatara Hill Quad.: Wood, G. H., Jr., 9
Tower City Quad.: Wood, G. H., Jr., 10
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- Llewellyn Formation, Pennsylvanian: Wood, G. H., Jr., 3
- Mapledale Till, Pleistocene: White, G. W., 4
- Maskenozha Member of the New Scotland Formation, Devonian: Epstein, A. G., 1
- Mather Sandstone Lentil, Pennsylvanian: Martin, W. D., 2
- Mercer Formation, Pennsylvanian: Edmunds, W. E., 2
- Mifflintown Formation, Silurian: Miller, J. T., 1
- Milesburg Member of the Coburn Formation, Ordovician: Thompson, R. R., 2
- Millbach Formation, Cambrian: Geyer, A. R., 1
- Millstone Run Formation, Pennsylvanian: Edmunds, W. E., 3
- Mineral Springs Formation, Pennsylvanian: Edmunds, W. E., 3
- Minisink Limestone, Devonian: Epstein, A. G., 1
- Montebello Sandstone Member of the Mahantango Formation, Devonian: Wood, G. H., Jr., 14
- Mount Carbon Member of the Pocono Formation, Mississippian: Trexler, J. P., 3
- New Enterprise Member of the Salona Formation, Ordovician: Thompson, R. R., 2
- Old Port Formation, Devonian: Conlin, R. R., 1
- Pen Argyl Member of the Martinsburg Formation, Ordovician: Drake, A. A., Jr., 7
- Pittsburgh Formation, Pennsylvanian: Berryhill, H. L., Jr., 1
- Pond Bank Deposit, Cretaceous: Tschudy, R. H., 1
- Pump Run Diamict, Quaternary: Pierce, K. L., 1
- Redstone Member of the Pittsburgh Formation, Pennsylvanian: Flint, N. K., 3
- Richland Formation, Cambrian: Geyer, A. R., 1

- Rickenback Dolomite, Cambrian: Drake, A. A., Jr., 3
- Roaring Spring Member of the Salona Formation, Ordovician: Thompson, R. R., 2
- Rockview Member of the Axemann Limestone, Ordovician: Lees, J. A., 1
- Rocky Hollow Diamicton, Quaternary: Pierce, K. L., 1
- Selinsgrove Limestone, Devonian: Wood, G. H., Jr., 14
- Sewickley Member of the Pittsburgh Formation, Pennsylvanian: Flint, N. K., 3
- Shady Grove Formation, Cambrian: Root, S. I., 2
- Shawnee Island Member of the Coeymans Formation, Devonian: Epstein, A. G., 1
- Sherman Creek Member of the Catskill Formation, Devonian: Dyson, J. L., 2
- Sherman Ridge Formation, Silurian: Miller, J. T., 1
- Shoenberger Member of the Nittany Dolomite, Ordovician: Spelman, A. R., 1
- Slippery Rock Till, Pleistocene: White, G. W., 4
- Snitz Creek Formation, Cambrian: Geyer, A. R., 1
- Snyder Formation, Ordovician: Rones, M., 3
- Specht Kopf Member of the Catskill Formation, Devonian: Trexler, J. P., 3
- Staufferstown Formation, Ordovician: Root, S. I., 2
- Staufferstown Member of the Stonehenge Limestone, Ordovician: Sando, W. J., 1
- Stormville Member of the Coeymans Formation, Devonian: Epstein, A. G., 1
- Stumpy Run Diamicton, Quaternary: Pierce, K. L., 1
- Susquehanna Group, Devonian: Miller, J. T., 2
- Tloga Metabentonite: Dennison, J. M., 1
- Titusville Till, Pleistocene: White, G. W., 1
- Township Run Diamicton, Quaternary: Pierce, K. L., 1
- Uniontown Formation, Pennsylvanian: Berryhill, H. L., Jr., 1
- Walcksville Sandstone Member of the Catskill Formation, Devonian: Klemie, H., 2
- Waynesburg Formation, Pennsylvanian-Permian: Berryhill, H. L., Jr., 1
- Wynps Gap Limestone, Mississippian: Flint, N. K., 3
- Zooks Corner Formation, Cambrian: Meisler, H., 7
- Zullinger Formation, Cambrian: Root, S. I., 2
- ULTRAMAFIC ROCKS**, *see also* individual types
- Chester County
- alteration: Buse, M. L., 1
- State Line-Baltimore Gneiss complex: Thayer, T. P., 2
- Lancaster County
- Mine Ridge: Villaume, J. F., 1
- State Line-Baltimore Gneiss complex: Thayer, T. P., 2
- Pennsylvania-Southeastern: Larrabee, D. M., 1
- UNION COUNTY**, *see also* Pennsylvania, and Pennsylvania-Central
- Glacial geology*
- Pleistocene: Wells, J. A., 1
- URANIUM**, *see also* uranium-bearing minerals, and Mineral resources
- Berks County: Walker, G. W., 1
- Cambria County, coal: Vine, J. D., 1
- Carbon County, Lehighton Quad.: Klemie, H., 2
- Clearfield County, coal: Vine, J. D., 1
- Northampton County: Walker, G. W., 1
- Pennsylvania: Butler, A. P., Jr., 1; Gabelman, J. W., 2; Klemie, H., 1; McCauley, J. F., 1
- ground water: Scott, R. C., 1
- Pennsylvania-Northeastern: Fischer, R. P., 1
- Pennsylvania-Southeastern, Triassic: Myers, P. B., Jr., 1
- VANADIUM**, *see also* vanadium-bearing minerals, and Mineral resources
- Pennsylvania-Southeastern, traces in stream sediments: Keith, M. L., 2
- VENANGO COUNTY**, *see also* Pennsylvania, Pennsylvania-Northwestern, and Pennsylvania-Western
- Economic geology*
- petroleum, Titusville-Oil City district: Maxwell, N. E., 1
- petroleum and natural gas
- Foxburg Quad.: Bergsten, J. M., 1
- Red Valley Sandstone: Kelley, D. R., 2
- Geomorphology*
- Good Cave: Smith, G. G., Jr., 1
- Maps*
- economic, petroleum and natural gas, Foxburg Quad.: Bergsten, J. M., 1
- isopachous, Devonian, Red Valley Sandstone: Kelley, D. R., 2

structure contour, Devonian, Venango Sandstone, Foxburg Quad.: Bergsten, J. M., 1

Sedimentary petrology

Devonian sandstones: Townes, H. L., 1; Whieldon, C. E., Jr., 2
Venango First Sandstone: Fettke, C. R., 2
Venango Second Sandstone: Fettke, C. R., 1; U. S. Bur. Mines, 3

Stratigraphy

Devonian
petroleum potential: Townes, H. L., 1
Red Valley Sandstone: Kelley, D. R., 2
Mississippian-Pennsylvanian, Foxburg Quad.: Bergsten, J. M., 1

WARREN COUNTY, see also Pennsylvania, Pennsylvania-Northwestern, and Pennsylvania-Western

Economic geology

natural gas
Warren Quad.: Lytle, W. S., 9, 16
Youngsville Quad.: McGlade, W. G., 1
petroleum
Devonian, Glade Sandstone: Linn, E. H., 3
Warren Quad.: Lytle, W. S., 9, 16
Youngsville Quad.: McGlade, W. G., 1
petroleum and natural gas, Youngsville-Sugar Grove area: Siefert, W. H., 1

Engineering geology

Allegheny dam: Ferguson, H. F., 1

Geophysical investigations

acoustic properties, Devonian, Glade Sandstone: Komar, C. A., 1

Maps

economic, oil and gas fields: Lytle, W. S., 16
Warren Quad.: Lytle, W. S., 9
Youngsville Quad. area: McGlade, W. G., 1
isopachous, Devonian
Glade Sandstone, Youngsville Quad.: McGlade, W. G., 1
Red Valley Sandstone: Kelley, D. R., 2
structure contour, Devonian
Glade rocks, Youngsville Quad.: McGlade, W. G., 1
"pink rocks", Warren Quad.: Lytle, W. S., 16

Paleontology

Echinoidea, Mississippian: Jackson, R. T., 1

Gastropoda, Mississippian, Waverly Formation: Hyde, J. E., 1

Sedimentary petrology

Devonian sandstones: Whieldon, C. E., Jr., 1
Glade Sandstone: Linn, E. H., 3; Overbey, W. K., Jr., 2; U. S. Bur. Mines, 2
Glade-Clarendon Sandstones: Rough, R. L., 1
Venango First Sand: Modaressi-Ghavanni, H., 1, 2; U. S. Bur. Mines, 1

Stratigraphy

Cambrian-Pennsylvanian, Warren Quad.: Lytle, W. S., 16
Devonian-Pennsylvanian
Warren Quad.: Lytle, W. S., 9
Youngsville Quad.: McGlade, W. G., 1

WASHINGTON COUNTY, see also Pennsylvania, Pennsylvania-Southwestern, and Pennsylvania-Western

Arcas described

Amity Quad.: Berryhill, H. L., Jr., 2
California Quad.: Schweinfurth, S. P., 1
Carmichaels Quad.: Kent, B. H., 4
eastern: Kent, B. H., 7
Ellsworth Quad.: Berryhill, H. L., Jr., 3
guidebook: Kent, B. H., 1
Hackett Quad.: Kent, B. H., 2
Mather Quad.: Kent, B. H., 5
Monongahela Quad.: Roen, J. B., 1
Washington East Quad.: Swanson, V. E., 1
Washington West Quad.: Berryhill, H. L., Jr., 4

Economic geology

clay, Washington West Quad.: Berryhill, H. L., Jr., 4
coal, bituminous
Amity Quad.: Berryhill, H. L., Jr., 2
Ellsworth Quad.: Berryhill, H. L., Jr., 3
Washington East Quad.: Swanson, V. E., 1
Washington West Quad.: Berryhill, H. L., Jr., 4
mineral resources
California Quad.: Schweinfurth, S. P., 1
Carmichaels Quad.: Kent, B. H., 4
Hackett Quad.: Kent, B. H., 2
Mather Quad.: Kent, B. H., 5
Monongahela Quad.: Roen, J. B., 1

- natural gas
 Amity Quad.: McGlade, W. G., 3
 Claysville Quad.: McGlade, W. G., 3
 Ellsworth Quad.: Berryhill, H. L., Jr., 3
- petroleum
 Amity Quad.: McGlade, W. G., 3
 Claysville Quad.: McGlade, W. G., 3
 Ellsworth Quad.: Berryhill, H. L., Jr., 3
- Engineering geology*
 land use evaluation, eastern: Kent, B. H., 7
 mine drainage disposal: Stefanko, R., 1
- Geochemistry*
 albertite, analysis: King, L. H., 1
 grahamite, analysis: Ergun, S., 4
- Maps*
 economic, oil and gas fields
 Amity Quad.: McGlade, W. G., 3
 Claysville Quad.: McGlade, W. G., 3
 oil wells, Washington City: McGlade, W. G., 3
- geologic
 Amity Quad.: Berryhill, H. L., Jr., 2
 California Quad.: Schweinfurth, S. P., 1
 Carmichaels Quad.: Kent, B. H., 4
 Ellsworth Quad.: Berryhill, H. L., Jr., 3
 Hackett Quad.: Kent, B. H., 2
 Mather Quad.: Kent, B. H., 5
 Monongahela Quad.: Roen, J. B., 1
 Washington East Quad.: Swanson, V. E., 1
 Washington West Quad.: Berryhill, H. L., Jr., 4
- lithologic
 Ellsworth Quad.: Kent, B. H., 7
 Hackett Quad.: Kent, B. H., 7
- structure contour
 Mississippian, Blg Injun Sandstone: McGlade, W. G., 3
 Pennsylvanian, Pittsburgh Coal
 Amity Quad.: Berryhill, H. L., Jr., 2
 California Quad.: Schweinfurth, S. P., 1
 Carmichaels Quad.: Kent, B. H., 4
 Ellsworth Quad.: Berryhill, H. L., Jr., 3
 Hackett Quad.: Kent, B. H., 2
 Mather Quad.: Kent, B. H., 5
 Monongahela Quad.: Roen, J. B., 1
 Washington East Quad.: Swanson, V. E., 1
 Washington West Quad.: Berryhill, H. L., Jr., 4
- Paleontology*
 Amphibia, Pennsylvanian-Permian: Beerbower, J. R., 3
- palynomorphs, Permian, Little Washington Coal: Clendenning, J. A., 4
- Stratigraphy*
 Devonian-Pennsylvanian
 Amity Quad.: McGlade, W. G., 3
 Claysville Quad.: McGlade, W. G., 3
- Pennsylvanian
 Amity Quad.: Berryhill, H. L., Jr., 2
 Ellsworth Quad.: Berryhill, H. L., Jr., 3
 guidebook: Kent, B. H., 1
 nomenclature: Berryhill, H. L., Jr., 1, 5
 Washington West Quad.: Berryhill, H. L., Jr., 4
- Pennsylvanian-Permian
 California Quad.: Schweinfurth, S. P., 1
 Carmichaels Quad.: Kent, B. H., 4
 Hackett Quad.: Kent, B. H., 2
 Mather Quad.: Kent, B. H., 5
 Monongahela Quad.: Roen, J. B., 1
 Washington East Quad.: Swanson, V. E., 1
- Permian
 Amity Quad.: Berryhill, H. L., Jr., 2
 Ellsworth Quad.: Berryhill, H. L., Jr., 3
 guidebook: Kent, B. H., 1
 nomenclature: Berryhill, H. L., Jr., 1, 5
 Washington West Quad.: Berryhill, H. L., Jr., 4
- Pleistocene
 California Quad.: Schweinfurth, S. P., 1
 Carmichaels Formation, guidebook: Kent, B. H., 1
 Monongahela Quad.: Roen, J. B., 1
 Washington East Quad.: Swanson, V. E., 1
- Quaternary
 Amity Quad.: Berryhill, H. L., Jr., 2
 Carmichaels Quad.: Kent, B. H., 4
 Ellsworth Quad.: Berryhill, H. L., Jr., 3
 Hackett Quad.: Kent, B. H., 2
 Mather Quad.: Kent, B. H., 5
 Washington West Quad.: Berryhill, H. L., Jr., 4
- WEATHERING**
 Franklin County, McConnellsburg Quad.: Pierce, K. L., 1
 Fulton County, McConnellsburg Quad.: Pierce, K. L., 1
 Monroe County, residual clay: Epstein, J. B., 5
 Pennsylvania-Northwestern, glacial till: Sitler, R. F., 2
 Pennsylvania-Southeastern
 ringing rocks: Schlossman, S., 1
 serpentinite: Gordon, R. B., 1

WELLS AND WELL LOGS

Armstrong County, Foxburg Quad.: Bergsten, J. M., 1
Butler County, Foxburg Quad.: Bergsten, J. M., 1
Clarion County, Foxburg Quad.: Bergsten, J. M., 1
Pennsylvania, Devonian-Pennsylvanian: Lytle, W. S., 6
Pennsylvania-Northwestern, Paleozoic: Fettke, C. R., 21; Kreidler, W. L., 1
Pennsylvania-Western, Devonian-Pennsylvanian: Kelley, D. R., 5
Venango County, Foxburg Quad.: Bergsten, J. M., 1
Warren County, Youngsville Quad.: McGlade, W. G., 1

WESTMORELAND COUNTY, *see also* Pennsylvania, and Pennsylvania-Western

Areas described

Donegal Quad.: Shaffner, M. N., 1
Monongahela Quad.: Roen, J. B., 1

Economic geology

coal, bituminous, Donegal Quad.: Shaffner, M. N., 1
mineral resources, Monongahela Quad.: Roen, J. B., 1
natural gas
Donegal Quad.: Shaffner, M. N., 1
Dry Ridge pool: Goth, J. H., Jr., 1
Kohl gas field: Cate, A. S., 7

Geomorphology

Bear Cave: Schmidt, V. A., 2
Con Cave: White, W. B., 5
Coon Cave: Dunn, J. R., 4
Copperhead Cave: Dunn, J. R., 5
Devil's Den Cave: Haarr, A. P., 1; Hauer, P. M., 5
Evae Cave: Dunn, J. R., 7
Falling Creek Cave: Haarr, A. P., 1
Freeman Falls Cave: Dunn, J. R., 8
Hillside Bone Cave: Nelson, B. N., 1
Ken's Cave: Nelson, B. N., 2
Lemon Hole Cave: Dunn, J. R., 1; Schmidt, V. A., 1
Lyeippus Cave: Dunn, J. R., 9
Spider Cave: Bianculli, A., 1

Ground water

Donegal Quad.: Shaffner, M. N., 1

Maps

economic

Brookville Coal, Donegal Quad.: Shaffner, M. N., 1
Lower Kittanning Coal, Donegal Quad.: Shaffner, M. N., 1
natural gas: Lytle, W. S., 6

geologic

Donegal Quad.: Shaffner, M. N., 1
Monongahela Quad.: Roen, J. B., 1

structure contour, Pennsylvanian

Pittsburgh Coal, Monongahela Quad.: Roen, J. B., 1
Upper Freeport Coal, Donegal Quad.: Shaffner, M. N., 1

Paleontology

Amphibia, Pleistocene, cave deposits: Tihen, J. A., 1
Gastropoda, Pennsylvanian: Burke, J. J., 1

Sedimentary petrology

Upper Freeport Coal: Koppe, E. F., 4

Stratigraphy

Mississippian-Permian, Donegal Quad.: Shaffner, M. N., 1
Pennsylvania-Permian, Monongahela Quad.: Roen, J. B., 1
Pleistocene, Monongahela Quad.: Roen, J. B., 1

WYOMING COUNTY, *see also* Pennsylvania, and Pennsylvania Northeastern

Areas described

Ransom Quad.: Kehn, T. M., 2

Economic geology

sand and gravel, Ransom Quad.: Kehn, T. M., 2

Maps

geologic, Ransom Quad.: Kehn, T. M., 2
structure contour, Pennsylvanian, Pottsville Formation, Ransom Quad.: Kehn, T. M., 2

Paleontology

Algae, Pennsylvanian: White, C. D., 1
Arthropoda, Devonian, Catskill Formation: Kjelleswig-Waering, E. N., 1

Stratigraphy

Pennsylvanian, Ransom Quad.: Kehn, T. M., 2
Pleistocene, Ransom Quad.: Kehn, T. M., 2

X-RAY INVESTIGATIONS

Clearfield County, well cuttings, correlation: Hooper, W. F., 1

YORK COUNTY, *see also* Pennsylvania, and Pennsylvania-Southeastern

Areas described

Mount Holly Springs Quad.: Freedman, J. L., 2

Economic geology

iron, Harpers Formation: Gray, C., 4; Socolow, A. A., 11
limestone: Weaver, K. N., 1
mineral resources, Mount Holly Springs Quad.: Freedman, J. L., 2
natural gas: Gardner, F. J., 1
stone, Thomasville Quarry: Cloos, E., 6

Geochemistry

gold in diabase: Gottfried, D. J., 2

Geomorphology

caves: Miller, C., 1

York area: Smeltzer, B. L., 2

Codorus Creek Basin: Bourquard, Geil, and Assocs., 1

Colmoru Cave: Rudisill, H., 1

Craighead Cave: Smeltzer, B. L., 39

Devil's Hole Rock Shelter: Smeltzer, B. L., 41

Marble Cave: Smeltzer, B. L., 4

Pigeon Cave: Smeltzer, B. L., 8

Railroad Rock House Cave: Smeltzer, B. L., 49

St. Mark's Cave: Smeltzer, B. L., 56

Sandy Cave: Smeltzer, B. L., 9

Willis Run Pit Cave: Hauer, P. M., 6

Geophysical investigations

aeromagnetic, southern: Socolow, A. A., 8

magnetic, Dillsburg area: Coleman, K. F., 1

Ground water

Codorus Creek Basin: Bourquard, Geil, and Assocs., 1

Gifford Pinchot Park: Montgomery, H. B., 2

Triassic, New Oxford Formation: Wood, P. R., 1

Maps

aeromagnetic

Abbottstown Quad.: Bromery, R. W., 34

Dillsburg Quad.: Bromery, R. W., 28

Glen Rock Quad.: Bromery, R. W., 40

Hampton Quad.: Bromery, R. W., 41

Hanover Quad.: Bromery, R. W., 42

Lineboro Quad.: Bromery, R. W., 54

Manchester Quad.: Bromery, R. W., 42

Mechanicsburg Quad.: Bromery, R. W., 31

Middletown Quad.: Bromery, R. W., 49

Mount Holly Springs Quad.: Bromery, R. W., 32

New Cumberland Quad.: Bromery, R. W., 50

New Freedom Quad.: Bromery, R. W., 40

Red Lion Quad.: Bromery, R. W., 52

Seven Valleys Quad.: Bromery, R. W., 54

West York Quad.: Bromery, R. W., 57

York Quad.: Bromery, R. W., 59

geologic

Mount Holly Springs Quad.: Freedman, J. L., 2

Triassic, New Oxford Formation:

Wood, P. R., 1

ground water, Triassic, New Oxford Formation: Wood, P. R., 1

lithofacies, Wissahickon Schist: Southwick, D. L., 1

Meteorites

Shrewsbury: Mason, B., 3; Horback, H., 1; Turekian, K. K., 2

Minerology

calcite, Thomasville: Broughton, P., 2

laumontite, Dillsburg: Lapham, D. M., 9

leonhardite, Dillsburg: Lapham, D. M., 9

Palaeontology

Cambrian

Brachiopoda: Rowell, A. J., 1

Echinodermata, Kinzers Formation: Durham, J. W., 1

Gastropoda, Kinzers Formation: Yochelson, E. L., 3

Pleistocene, Bootlegger Sink blots: Guilday, J. E., 12

Triassic

pteriodophyte, New Oxford Formation: Bock, W., 2

Reptilia: Gregory, J. T., 2

Petrology

diabase, zinc content: Chao, E. C. T., 1

granophyre, analysis: Gottfried, D. J., 1

Stratigraphy

Cambrian, Thomasville quarry: Cloos, E., 6

Precambrian-Cambrian, Mount Holly Springs Quad.: Freedman, J. L., 2

Triassic, New Oxford Formation: Wood, P. R., 1

Structural geology

folded folds, Piedmont: Freedman, J. L., 1

Wissahickon Schist: Hanscom, R., 1

ZINC, *see also* zinc-bearing minerals, and Mineral resources

Chester County, Perkiomenville: Woodhouse, J., 2

Lehigh County, Friedensville: Callahan, W. H., 2; Hoagland, A. D., 1

paleophysiographic controls: Callahan, W. H., 1

Pennsylvania: McKnight, E. T., 3

oxidized: Heyl, A. V., 1

Pennsylvania-Southeastern, traces in stream sediments: Keith, M. L., 2

ZIRCON, *see also* Heavy minerals

York County, Dillsburg Sill: Chao, E. C. T., 1

